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THE BUILDING OF
CULTURES

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PREFACE

AT a time when so many books are appearing dealing with environment in relation to man, and with the problems of the origin and diffusion of his culture, some apology would seem to be due for adding still another to the list. My excuse is twofold. For some years I have been offering a course dealing with these questions. Some of my students have assured me (whether truthfully or not, the reader must judge) that the method of treatment I have followed in endeavoring to present these very complex and thorny problems was a helpful one, and had aided them to see the whole question of the origin and growth of culture in a clearer light. In the pages that follow I have given a brief outline of these lectures, in the hope that they might be helpful to others. In the second place, I have felt that some of the current theories of diffusion and expositions of the processes involved called for more open criticism than they had received.

Controversy may be futile or helpful according to its purpose and the spirit in which it is carried out. In the present case I have criticized the theories of others because I believed it to be demonstrable that they were false, and because, although some of them have been proclaimed loudly and with a certain intolerance, there has hardly been a voice raised to call them in question and to present the other side. Others as well as I have felt that in consequence the layman might mistake silence for assent. I have in most cases great admiration for the work which the writers criticized have done along other lines, and it is with regret that I find myself obliged to differ with them, and to differ on the whole fundamentally, in regard to the char-

acter and processes of culture growth. I may add that the views expressed are by no means merely my own, and that as regards the Heliolithic Theory at least, I believe it is fair to say that the great majority of my fellow anthropologists in this country agree with me in counting it as invalid.

To the discussion of environment I have given relatively little space. I could wish to have discussed this vital but very complex and perplexing question more adequately and in detail, but to have done so would have required too much space in a book designed to treat in brief outline the whole subject of culture origins and development. The question is so large that a satisfactory presentation of the evidence and its discussion would require a volume in itself.

If in presenting my subject I appear at times to be dogmatic it is largely because, in a small volume designed for the general reader, it is impossible often to offer the evidence on which the conclusions have been based; and if much that I have said appears trite, I would say only in excuse that because a thing is obvious is no reason why it should not be significant, and that it has often been the disregard of the obvious that has led investigators astray.

In conclusion, I have to thank Doctor A. C. Haddon and the *Journal of the Royal Anthropological Institute of Great Britain and Ireland* for permission to reproduce a number of illustrations, and also Doctor Clark Wissler for his courtesy in allowing me to reprint several of the diagrams from his recent volume on "The Relation of Nature to Man in Aboriginal America."

HARVARD UNIVERSITY,
October 15, 1927.

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THE BUILDING OF CULTURES

INTRODUCTION

THE term culture has come to be used by anthropologists, sociologists, and others as a designation for that totality of a people's products and activities, social and religious order, customs and beliefs which, in the case of the more advanced, we have been accustomed to call their civilization. We speak of Egyptian, Greek, and Chinese, or of European or American civilization, for we regard these peoples and ourselves as civilized in contrast with the great mass of uncivilized, barbarous, and savage peoples. But these latter have, as a matter of fact, their own cultures, "civilizations" as definite and characteristic as those of their more favored relatives. Indeed, the Eskimo or the Australian aborigines, the Mongol, and the Congo Negro exhibit a far greater individuality in their modes of life, customs, and beliefs than did the Greeks and Romans, or than do the Italians, Germans, or English of to-day. Culture is thus a better term to use than civilization when we are discussing mankind as a whole, or comparing one people with another, for it carries with it no connotation of high or low, of advancement or degeneration, and may be used without prejudice in reference alike to primitive savages or to ourselves.

The culture of any people comprises the sum of all their activities, customs, and beliefs. These fall rather naturally into three main categories—the physical, the social, and the religious. The first of these—which the anthropologist is accustomed to speak of as comprising material culture, since it deals primarily with material things—includes such factors as food, dress, dwellings, implements, arts and indus-

tries. They are elements of culture which are tangible, readily open to observation, and capable of objective preservation, in contrast with the non-material and vastly more perishable social and religious factors. To these latter belong, on the one hand, all such features as the forms of marriage, social groupings and customs, and political government, and, on the other, the whole mass of religious beliefs and mythology, together with their outward expression in ritual and cult and in the persons of shamans or priests.

Each of these three major categories into which culture may for convenience be divided, comprises a vast number of individual cultural elements or traits, as the anthropologist calls them. Thus, to take examples from material culture, the use of moccasins, of tattooing, of the bow, of pottery, of writing are cultural traits which any given culture may or may not possess. Any culture, therefore, however complex or highly developed, may be analyzed into its component traits, and every culture consists of a greater or lesser number of such traits, which may furthermore be individually feebly or highly developed.

Such an analysis of cultures into their component traits enables one not only to compare the cultures qualitatively and quantitatively, but to probe deeply into their origins and manner of growth. For as we compare one culture with another, a higher with a lower, the first and most obvious fact which emerges is that the higher cultures differ from the lower in possessing both a greater number of traits as well as traits of a higher stage of development. The wealth of traits which a culture possesses and the stage of perfection of its traits decreases as we descend the scale of culture, until, when we reach such very primitive folk as the now extinct Tasmanians, we are within measurable distance of those very beginnings of culture which set our earliest human ancestors off as man.

Clearly, then, if we are to seek for the origins of culture, we must seek first the origins of the multitude of traits of which it is composed; and if we wish to trace its growth we must observe the processes by which trait is added to trait, thereby producing the whole gamut of culture from that of the lowly Tasmanian to our own amazingly complex and glittering one of to-day.

In the origin and growth of human culture there are three primary factors involved; those, namely, of environment, of diffusion, and of nationality or race. In the following pages I shall endeavor to show in what fashion and to what extent each of these factors is active, and how, through their interaction, the building of cultures takes place.

CHAPTER I

THE INFLUENCE OF ENVIRONMENT

THAT his environment should and does affect man in a great variety of ways seems so obvious as hardly to admit of discussion. If, for example, we compare the Eskimo with the African Negro, we find countless features of their life which are in striking contrast, and which are apparently directly correlated with the characters of the widely differing habitats in which they live. The Eskimo in his arctic environment obviously cannot derive any of his food-supply from agriculture, and must protect his body from the rigors of the climate by means of the warmest fur clothing; whereas the Negro is easily able in his tropical home to raise a large variety of vegetable products, and does not need to wear any clothing at all. Stated thus baldly, the relation of culture to environment seems clear enough, but we shall see that there are many respects in which the problem is not so simple.

The more obvious correlations between human culture and environment were early noted. As far back as the fourth century B. C. we find Hippocrates discussing the influence of climate and concluding that every climate and kind of physical environment had its definite and inevitable effects on man's life. But although Aristotle considered the question of the influence of geographic position as affecting national character and the forms of law and government, little further attention seems to have been paid to the problem until the fourteenth century, when Ibn Khaldun,

the Arabic philosopher and historian, sought to explain all history and the development of civilization through environmental effects.

With the revival of Greek thought in France during the Renaissance interest was turned in this direction. In the sixteenth century Jean Bodin, and in the eighteenth Montesquieu, discussed at some length the great influence which climate and the character of the soil exerted upon a people's culture. Taine later took up the point in France, and in England Buckle made large use of it in his work. It was in Germany, however, that the greatest interest was taken. There, early in the nineteenth century, Ritter laid the firm foundations upon which somewhat later Ratzel built up the first really scientific and systematic study of the whole problem—a study continued and amplified in this country by Miss Semple, and, in respect to climate alone, by Huntington. Whereas the German school and its descendants have tended to emphasize the compulsory force of environment, and sought to formulate laws by which it works, the modern French school, as represented by Vidal de la Blache and Brunhes, lay stress rather on what may be called its permissive character, arguing that environment offers opportunities which may or may not be accepted.

That the modern interest in man's relation to his environment has been greatly stimulated by the attention given in recent years to environmental studies in relation to animals and plants seems clear. The definiteness, in many ways, of their response to changes in environment, has doubtless been largely responsible for the enthusiasm that has led some writers to overemphasize the significance of environmental factors in the case of man. Since, as we shall see, the extent and character of the influence exerted by environment lies at the very bottom of the whole problem of the origin and growth of culture, it will be necessary

for us to examine into the matter somewhat systematically as a preliminary to our main discussion.

To obviate any misunderstanding it may be well to note at the outset, that the term environment will be used here as referring to the physical environment alone, *i. e.*, to the climate, nature of soil, flora, fauna and mineral resources, topography, and general character of an area. It thus represents the sum of the whole physical background of life. The matter of definitions settled, we may begin our consideration of environment by differentiating between the physical and cultural influences which it may exert. On the whole, the physical effects definitely attributable to environment are disappointingly few. The belief long held, for example, that the skin color of the Negro and other dark-skinned peoples was the direct result of tropical climate can, in the light of our present knowledge, no longer be maintained. The almost black-skinned Tasmanian lived, and had lived apparently for countless ages, in a temperate environment comparable to that of southern England, whereas some peoples of Indonesia and tropical America are little if any darker than many Europeans. The real explanation for the development of excessive pigmentation is still in a measure uncertain, and although a climatic factor is probably involved, there are clearly others which are equally if not more important.

As our present interest is primarily cultural, it will not be necessary for us to delay by examining in detail the demonstrable physical influences attributable to environment. Suffice it to say that the number of significant physical effects appears to be very limited. That stature is, for instance, in some measure affected by abundance of food seems clear, although striking exceptions occur. Residence at a high altitude leads to a large increase in the number of red blood-corpuscles in the blood, but so far as can be seen,

the fact is of little consequence. Physical energy is depressed by heat and high humidity, but practically all data have been obtained by the study of the white man alone, and one cannot be sure that they apply directly to peoples of tropical origin. Climatic factors, too, play a part in the distribution of certain diseases, and may also affect the secretions of some of the endocrine glands, with possible far-reaching consequences. The study of these questions is still, however, in its infancy, and we may turn from the limited field of the demonstrable physical effects of environment to the much larger and more debatable one of its cultural influences.

At the outset we must realize that the influence of environment may be either direct or indirect. The use of the snow house by the Eskimo or the high development of navigation in Polynesia are obviously direct effects of the respective environments, whereas the frequent absence of strongly centralized government among desert folk, due to their existence in small groups widely scattered on account of the paucity of the food-supply, is an instance of indirect influence. Very often, however, the matter is much more involved and the ultimate indirect results of a particular environment may be separated by many intermediate steps from the primary effect. Direct influences are as a rule more evident and demonstrable in material culture, which obviously depends in many ways on habitat, whereas the indirect effects are more commonly seen in the social or religious aspects of life. But it should be noted that with every increase in indirectness there comes a parallel increase in the number of other factors which may also be responsible for the result, so that the precise share of environment in the outcome is not easy to decide. Failure to realize this fact has led to many of the extravagant claims made by some environmental enthusiasts.

A further distinction to be noted in analyzing the influence exerted by environment is that its effect may be either negative or positive—it may impose certain restrictions or prohibitions or it may offer certain opportunities. Thus, to take extreme examples, an arctic environment prohibits the use of agriculture and tends, because of the limitation of food-supplies, to restrict the population to scattered groups of small size; whereas a fertile region possessing a favorable climate and well-indented shore-line offers opportunities for the development of agriculture, maritime activity, and large centres of population. How effective the restrictions are or how absolute the prohibitions, depends to a considerable extent on the stage of cultural development attained by the inhabitants. The thinly scattered occupants of the Klondike originally subsisted solely by hunting and fishing and numbered but a few hundreds, but the discovery of gold brought into being a busy city with a cosmopolitan population of some ten thousand persons, where a wide variety of food products, including fresh vegetables grown under glass, could be had for a price.

How far, on the other hand, the opportunities offered are utilized, depends on a variety of factors which we shall consider later. For these opportunities may be actively exploited and full advantage taken of the permission thus given by nature for cultural advance, or they may be undiscovered, unappreciated, or utilized only in a meagre degree. On the whole, the negative aspect of environment is of relatively minor consequence, for the absolute prohibitions it imposes are few and obvious; and although its restrictive effects are much wider, they are very varied in intensity and seem to serve often as actual stimuli to cultural advance. The positive opportunities, on the other hand, are for the growth of culture far more significant, and we shall see that it is in their acceptance and utilization that civiliza-

tion has its origin and that by them, largely, it makes its advance.

Further, it is to be observed that in its influence on culture environment affects some aspects more easily and rapidly than others. The material side of culture—such traits as food, dress, dwellings, implements, and industries—is to a large extent dependent upon climate and topography and the raw materials available. It is, therefore, not surprising that it is in this field that environment makes itself most clearly and demonstrably felt. A cold climate is reflected in the dress of its inhabitants, a rugged mountain region tends to inhibit the use of wheeled vehicles, and the relative abundance of wood or easily worked stone may powerfully affect the type of architecture which a people will evolve. On the social and religious side the influence of environment is both less obvious and less inherent. The practice of polygamy, for example, has little relation to the character of the habitat, for a man may have several wives in the arctic just as well as in the tropics. Similarly the presence or absence of a clan organization, or puberty ceremonies, or ritual sacrifice, or cremation is not directly influenced by environment. But the value of wives as field-laborers among a people taking advantage of the agricultural opportunities which their habitat affords, may make a plurality of wives of greater advantage than in a poor hunting community, where the more wives a man has the more mouths he has to feed. Indirectly, thus, environment may exert a not-unimportant influence on the non-material aspects of culture. But, as pointed out previously, the social and religious aspects of culture are in general so much more liable to conflicting influences among themselves, and are amenable to such a variety of other influences, that the often weak pressure of environment may be entirely neutralized and overcome. Thus, in the illustration just given, the practical advantages of polygamy in a given case may

be rendered quite ineffective by religious opposition, or greatly lessened by the presence of slavery. Since, again, the social and religious aspects of culture are generally less directly and much less definitely affected by environment than the material, they are slower to feel and show its influence. A radical change in environment due to migration, may thus profoundly modify a people's material culture long before their social structure or religious beliefs show any reaction. We may say, then, that environment exerts a relatively powerful influence on material culture, and one which is often, although not always direct; but that as regards non-material culture its control is less striking and generally indirect, and although it may actually be far-reaching is often subtle and elusive.

It must not for a moment be supposed, however, that even in material culture all the traits are even remotely or indirectly under the sway of environment. Its influence may be traceable in certain broader characteristics of the culture, whose details, on the other hand, are quite exempt. Thus an abundant supply of timber may make almost inevitable the use of a wooden house, but it neither dictates nor suggests whether this should be round or rectangular in ground plan; nor does the presence of available ores in any degree suggest the kind or shape or decoration of the implements of bronze or copper or iron into which they may be made. Of the totality of culture, thus, environment affects in general a minor although often very significant part. The smaller the content of culture, *i. e.*, the lower in the scale of cultural development it is, or the more pronounced the character of the environment, the greater relatively does the significance of this part tend to become. The progress of civilization has been marked by the enormous expansion of those fields of culture which lie outside the range of environmental influence.

It is in its beginnings, therefore, that culture leans most

heavily upon environment, and in its early stages that the influence of environment is most clearly seen. In the main environment is permissive, not mandatory; in general it offers opportunities, be they few or many, which man may take or leave as he chooses. Yet there are a few barriers which it erects, whereon is written: "They shall not pass."

Having outlined the general functions of environment in its relation to culture, we may now turn to consider in somewhat more detail in what environment consists, and how its influence on culture may be traced. We may begin by recognizing that environment consists of three primary elements—climate, topography, and raw materials—using this latter term to include the flora, fauna and mineral wealth of any region. Each of these elements may vary independently of the others, as where two regions have a similar climate but differ widely in topography and raw materials, or are of similar topography, yet have widely differing climates, etc. Moreover, each component may have its individual influence on culture. So the separate influences of the three components may, in a given case, all be positive, *i. e.*, favoring the development of culture, or one may be positive and the others negative, their influences thus to a certain extent counteracting each other. Furthermore, one component may tend to influence culture in one direction of development, another in another. We may, then, for our purposes, define environment as a complex of forces, affecting culture not only in their totality but also individually; and we may, therefore, study the influence on culture of the separate factors of environment or may attempt to evaluate the effect of their sum total.

It was Ratzel who first systematically employed the former of these lines of approach and thus attempted to develop a rigorous scientific method for the study of environment. As an example of this method we may take some of

the results derived from the study of climate by itself. That climate is one of the most important factors in environment, if not the most important, is obvious from the fact that it not only exerts a direct influence of its own, but works also through its virtual control of flora and fauna. Its influence, however, is frequently so closely interwoven with that of other factors that the effects traceable indirectly to climate are often difficult to isolate. Its direct influences are, on the other hand, usually quite obvious. An arctic climate makes adequate shelter necessary, whereas one that is dry and warm enables a people to get along without any at all—as in large parts of Australia—or with a flimsy construction designed to afford only shade, or protection from the wind. Note, however, that although an arctic climate forces man to build a warm shelter, it in no degree determines what form it shall take. The Eskimo makes it often of snow, the peoples of northern Asia of skins. It should also be observed that even in extreme or fairly extreme cases climate is not mandatory, for under conditions as arctic as among the Eskimo the Athabaskan Indians of the Mackenzie Valley lived in partially open tents, in which they suffered wretchedly from the cold. So the Yaghan of the west coast of Tierra del Fuego, although living in a climate comparable to that of Labrador, had no clothing at all except a single seal-skin hung over the shoulder toward the wind.

In its indirect influences through the control of the flora and fauna, the environmentalists point out that climate determines what crops can be grown and the regularity and extent of their yield, or what animals a pastoral folk may raise. This is, of course, true in the great majority of cases and hardly requires illustration, yet it must be remembered that our modern culture grows immense quantities of vegetable products under glass in defiance of climate,

and that by perfecting new types of grains and new methods of agriculture, we can raise large crops in regions whose climate formerly offered an insuperable obstacle. And such defiance of climate is not confined to modern culture. In the oases of the Suf in the northern Sahara, in an area where there are no springs or streams, the residents contrive to raise large quantities of date-palms in defiance of the aridity. By digging deep, funnel-shaped pits to a depth of fifteen or twenty feet they are enabled to plant the trees so that their roots penetrate to an underlying stratum of dampness. Only by incessant labor in keeping out the drifting sands, which threaten daily to fill up the pits, can this extraordinary cultivation be maintained. The Yakut, a Turkish-speaking and originally pastoral people, formerly living in southern Siberia along the Mongolian border, have, in the last few centuries, moved so far to the northward that their advance guards are now found within a short distance of the arctic coast. Although the climatic conditions in their present forest habitat are extremely arctic in character, they have carried their cattle with them, and by the greatest exertions are able to keep and breed them in an environment for which they are entirely unfitted.

From these examples it is easy to see that climate by itself, is capable of influencing culture directly or indirectly and often in a notable degree. But it is also clear that, except in rare cases, this factor of environment is not mandatory; that although given climatic conditions usually lead to a certain general result, there are often very striking exceptions. It is unsafe, therefore, to attempt, as do some of the environmentalists, to lay down "laws" of climatic influence.

That the same holds true in even larger measure for the other factors of topography and raw materials, may be

briefly illustrated by a few further illustrations. The environmentalists assert that arid and sub-arid plains or steppes enforce a nomadic life upon their inhabitants. The frequent correlation of nomad peoples and arid plains is unquestionably true, but the topographic factor here—the levelness of the surface—is really not the primary cause involved, for it is the climatic character of aridity, with the consequent scanty or migratory animal life or the rapid exhaustion of feed for domesticated herds, which prevent or hinder a sedentary life. Again, political expansion is said to be the dominant characteristic of plains peoples—Russia and the Prussian expansion in the North German Plain being cited as examples. Yet in other cases no such political growth occurred, for in the far more characteristic plains regions of northern Asia and America, South America and Australia, it was conspicuously absent.

A well-indented coast-line with many harbors and inlets, tends, it is said, to develop seafaring life, and numerous striking instances of people with maritime cultures living on such coasts are pointed out. But many equally striking exceptions exist, as, for example, in Tasmania, where with just such a coast-line the people were virtually destitute of any form of craft. Again, islands are said often to develop as centres of maritime culture, with far-reaching trade and commerce. The instances of Crete, the British Isles, and Japan are cited in confirmation of this. It is true that Crete *was* a striking example of such development; it is not so to-day. The other two cases must also be accepted with reserve, for England did not become a maritime country until Elizabethan times, when economic influences external to itself and unrelated to its insular character, were instrumental in bringing about the change. Japan's development as a maritime and commercial state is really only a matter of the last fifty years, and has depended more on

her far-reaching adoption of European culture than on the insular character of her environment. Further, many cases may be noted where islands have failed to develop any maritime culture at all. Thus, in contrast to Crete, one may cite Corsica and Sardinia, where maritime activities have always been conspicuously absent. The Canary Islands are another notable example of the absence of seafaring abilities, for here the Guanches are described by most of the early authorities as wholly destitute of any means of navigation. The laws of topographic control of culture put forward thus, seem to be like those relative to climate, honored as often, or more often, in the breach as in the observance. Topography thus, as compared with climate, is less directly significant as a single factor and exerts, on the whole, a less definite and certain influence on culture. Its effects, however, in determining or guiding the spread of culture are often very important, as will be seen later.

The third factor in environment—the raw materials which it supplies—affects culture often very obviously and profoundly. By offering, for example, a particular type of food-supply in abundance, it does much to shape the life of a people, as in the case of the acorn in California, the salmon on the Northwest Coast, or the buffalo in the Plains. The absence, on the other hand, of any of the domesticable animals of the Old World in the New, made impossible in that whole area any development of pastoral life, just as the absence in Australia of any cultivable native food plants made impossible the local rise of agriculture. The existence of tin in Bolivia made possible the local independent invention of bronze; its absence in North America forbade the discovery or use of this alloy there except where introduced, as in Mexico. The presence, however, of a useful raw material does not by any means lead to any cultural result, for although tin occurs in Guiana as well as Bolivia, no use

was made of it in the former region and, in spite of the abundance of iron ores in America, no use of the metal was ever made. The converse is also true, *i. e.*, that the absence of a particular raw material does not preclude its influence on culture, for it may be brought in in sufficient quantity by trade. Thus the lack of any local supplies of copper did not prevent the Indians of the Ohio Valley from developing considerable skill in its cold-hammering and use for ornament, nor did the impossibility of growing tobacco keep the Alaskan Eskimo from being smokers and developing skill as makers of pipes, since they secured tobacco by trade from the peoples across Bering Straits, who in their turn got it from the Russians.

These random examples may serve to suggest some of the ways in which the several factors of environment influence culture, and also some of their limitations as well. It is clear that, in general, environmental factors offer either opportunities or obstacles, and that the former may or may not be utilized, whereas the latter may or may not be overcome. The reasons for the variability in effectiveness of environmental influences, and for the difficulty of deducing from their effects any definite laws, will be considered in later chapters.

The three main factors of which environment consists are, as has been said, climate, topography, and raw materials. There is, however, a fourth which stands somewhat apart, *i. e.*, geographic position. An area may be, in relation to the continent, let us say, in which it lies, either centrally or marginally located; or it may by its mere position be easily or difficultly accessible, and all of this quite irrespective of any climatic or topographic character of its own. This factor of position plays a very important part in the matter of cultural diffusion as will be later seen.

Until recently the study and discussion of the relation be-

tween culture and environment, have been largely if not entirely confined to the attempt to work out correlations between particular factors or features of environment and individual traits of culture along the lines indicated by the examples just given. Recently, however, several writers have approached the problem with a broader point of view. Huntington,¹ basing his conclusions on a study, on the one hand, of efficiency in factory labor and school examinations, and, on the other, on answers to a questionnaire asking for opinions in regard to the relative status of the civilization and cultural efficiency of all peoples, mapped out the world into zones and centres of cultural achievement in general, and correlated these with climate. He finds an optimum temperature and humidity for physical and intellectual efficiency based on the former investigation, and then finds that these conditions are naturally supplied only by the climates of the eastern United States and northwestern Europe. These are the areas in which, according to the majority of his informants' opinions, the world's highest cultural achievements have been attained. Since then the areas showing the optimum of climate and the optimum of culture thus coincide, he regards the correlation as established, and declares that cultural development is a direct function of climate, and that the stage of civilization, attained or attainable, rises and falls as the climate of any area approaches or recedes from his optimum. The obvious difficulty, that the present centres of highest culture are far removed from those of antiquity, is explained by the expedient of introducing far-reaching changes of climate, assigning to the ancient cultural centres an optimum of temperature and humidity which they are far from possessing to-day. The theory of extensive climatic changes is one for which Huntington has long and ably contended, and

¹ Huntington, E., "Civilization and Climate." New Haven, 1915.

he has used it with effect in fitting together the puzzle of civilization and climate.

This is not the place for a detailed consideration or criticism of Huntington's ingenious and effectively presented scheme. It may, however, be pointed out that the factory and school studies from which the optimum temperatures and humidities for physical and intellectual efficiency were deduced, were made primarily on white Americans in a limited area, and do not, it would seem, warrant the assumption that this is necessarily the optimum for other peoples in other parts of the world. Indeed, one may be fairly sure that similar studies on factory operatives, let us say, in Bombay or Canton, would give widely different results. To assume that peoples of Indian or Chinese origin, born and bred under tropical conditions, would find their optimum of efficiency in a temperature they may rarely experience, seems an extremely doubtful procedure. Further, it must be noted that the statistical treatment of the opinions secured in answer to the questionnaire amounts largely, if not entirely, to what might be called an "averaging of ignorance." For the opinions of seventy-five persons with no special knowledge of the subject, who place India, for example, ahead of China in cultural achievement, outweigh the judgment, let us say, of five who, on the basis of a real knowledge, might place China first. And this quite apart from the extreme difficulty of weighing two cultures of anything like similar grade against one another. The time element also, very obviously, comes in greatly to complicate and, in large measure, invalidate any such estimate, for a century may make a very considerable difference in the cultural achievement of a people, and is too short a time to be taken into account in any scheme of climatic changes, however nimble.

Quite apart, however, from these and other features of

the method which seem open to objections, there are a host of inconvenient but indisputable facts that alone serve seriously to invalidate the hypothesis. Thus the high cultures of Peru and Bolivia, which ranked next after that of the Maya, were developed on a hot and arid coastal strip and in a cool upland, in climates far removed from the theoretical optimum. And the Maya itself, irrespective of its later phases in northern Yucatan (whose climate Huntington, by rather desperate methods, contrives to indicate as having once perhaps been less tropical), was largely developed and reached its highest advancement in semi-tropical Guatemala and Honduras. Moreover Egypt, Babylonia, and the newly discovered very ancient culture of the Indus Valley cannot, even by stretching the theory of climatic changes to the breaking-point, be brought within the limits of the climatic optimum required. Lastly, it may be noted that so far as North America is concerned, the maximally favorable climatic conditions which are supposed to give rise to the modern high cultural status of the eastern United States, failed lamentably to produce any favorable result on the aboriginal Indian population. For the highest cultures north of Mexico, such as those of the Southwest and of the Northwest Coast, were in regions where the climatic factor fell far below the required point. That the Indians of the Eastern States and the Ohio valley region did not reach the high peak of culture which they should have done according to the theory, is recognized by Huntington, who attempts to explain the discrepancy by saying that since all the area was either forest or prairie, and since it was too much work to clear the forest, and prairie sod cannot be worked without iron tools, therefore no agriculture was possible and thus the attainment of a high culture failed. He does not appear to realize that in giving the presence of forest or prairie land as the reason why culture did not

develop he admits that climate is, after all, not the all-powerful determinant of culture which the theory demands. Moreover, the statement that it was "too much work" to clear the forest and that prairie sod cannot be cultivated except by iron tools, is so patently belied by the facts that the excuse ceases to have any value. The large amounts of agricultural products raised by the Indians of the whole of the Middle Atlantic States and west through the Ohio Valley are well known; the people were essentially sedentary, agricultural folk. That the prairie sod was cultivated to good effect with wooden digging-sticks and buffalo shoulder-blade hoes, the large supplies of corn grown by the Village Indians of the upper and middle Missouri bear witness.

However plausible the theory may look at first sight, and however magnificently it simplifies the complex problems of the rise and growth of civilization, it is faulty, I believe, both as regards method and fact, and neglects to give due weight to other elements which equal, if they do not greatly outweigh, the influence of climate.

A still wider view-point is taken by Wissler,¹ who endeavors to show that not only is every culture the direct result of the total environmental influence of the region in which it lives, but that this influence also determines the physical type of the people as well. Or, stated in other words, the world may be divided into a series of ecological areas, each marked by a definite environment. An ecological area may be defined as one marked by the presence of particular types of animal and plant life, due to prevailingly uniform climate and soil conditions. These ecological areas are each characterized by a definite culture, so that ecological and culture areas coincide. The people of each such area, furthermore, are regarded as being char-

¹ Wissler, C., "The Relation of Nature to Man in Aboriginal America," New York, 1926.

acterized by a particular physical type, due to a combination of specific physical traits, such as head-form, stature, etc., brought about through the selective influences of the environment. On this theory, therefore, environment is the basic and all-powerful determinator of both culture and race. This view represents the extreme possible environmental position in that, explicitly or implicitly, it attributes the whole content of any culture as well as the physical characters of its bearers to environmental effects. It denies any part in the building of culture, either to inheritance or diffusion, and relegates to the scrap-heap most of the fundamental assumptions and generally accepted conclusions of physical anthropology. It achieves its results only by ignoring a large proportion of the facts of history. We shall have occasion later to consider some aspects of the theory and some of its specific applications, so that further discussion of the points involved may be postponed.

Although, however, we may not, as I believe, assume both culture and race to be direct and exclusive functions of environment, there is a restricted sense, at least, in which a correlation exists between an ecological and a culture area. In our previous discussion of the influence of environment, we were dealing in the main with single features of this in relation to individual traits of culture. Now the culture of any particular people is made up, as stated in the introduction, of a great multitude of traits which either stand separate and unrelated or are linked in so-called trait complexes, of which we shall have more to say later. The cultures of no two tribes or peoples are exactly alike, for each either presents some traits the other lacks, or certain of the traits which it shares with its neighbor differ in details. Yet if we compare the cultures of a large number of tribes or peoples extending over a continuous area we find that they group themselves about certain centres, in

each of which are concentrated a group of traits which scatter outward, diminishing in number and intensity while other new ones appear which gradually increase in number and intensity, until we come into another centre of concentration in which a different group of traits becomes predominant. The areas characterized by such groups of traits, marking thus distinctive cultures, are known as culture areas. In North America, for example, where the analysis and comparison of cultures has been extensively carried on, there are some ten such culture areas recognized, each of which is marked by a large number of characteristic traits.

It must, however, be remembered that not *all* the traits in one culture area differ from those in its neighbors, for many traits such, for example, as agriculture, pottery-making, puberty ceremonies, etc., may be possessed in common by several areas. From this it may be seen at once that, since *all* the traits of a culture are not exclusive to it, it follows that the *whole* culture of any particular area cannot be derived from the environment. The characterization of a culture area is due to the presence within it of a group of traits, in part exclusively its own, and in part perhaps only more intensively developed, or developed in a different manner than elsewhere. It must also be remembered that the traits which characterize a culture area are not *all* found among *all* the tribes which compose it or are not present in exactly the same form or intensity. The characteristic traits are generally most marked in what one may call the nucleus of the area and gradually thin out and weaken toward the periphery. Lastly, it is very important not to overlook the fact already alluded to: that culture areas are very rarely sharply and decisively defined. The changes in culture as one passes from the nucleus of one area to that of the next are gradual and sometimes almost

imperceptible, and there is nearly always a transitional region where one culture is fading out and another gradually strengthening, so that it is difficult to draw any hard and fast line between them.

Having defined what we mean by a culture area we may now return to the question of how far and in what way these areas are correlated with environment. Just as in the case of culture, we find that it is possible to divide a continent or the whole world into a series of culture areas, so in something the same way it is possible to mark out a series of environmental or ecological areas, each of which possesses rather definite characteristics of its own. In North America, for example, we have stretching along the Pacific coast from southern Oregon to Mount St. Elias and beyond, a region a hundred miles or so in width, which is throughout rugged or distinctly mountainous, heavily forested, with deeply indented and fiorded shore-line, for a long distance fringed with islands, and marked by an equable climate with heavy precipitation. This area has a fairly uniform flora and fauna and constitutes a perfectly definite environmental and ecological region. Other areas of varying size and differing characteristics may similarly be defined. In view of the great significance of the factors of climate and raw materials in influencing human culture, it is not surprising that culture areas are often strikingly accordant with ecological regions.

Environmental areas differ from culture areas in that the uniformity of the former is often relatively less than in the case of the latter. For since environment comprises climate, topography, and raw materials, and each, as we have already seen, may vary independently of the others, it follows that in determining environmental areas we can only use a general average of conditions. A given environmental area may have an average climate which is much

the same throughout, its topography may be generally uniform, while similar animal and vegetable species and types of mineral products may characterize the whole. Although there are areas of this sort where an average of conditions prevails throughout, there are many where the topography is so varied that different portions of the region may show markedly different conditions as to climate, due to altitude, with correspondingly differentiated distribution of flora and fauna. Further, mineral wealth may be concentrated in one or two spots. Thus, unlike culture areas, environmental areas often show within themselves sharp and wide divergencies from the general average. Like culture areas, however, the characteristic features of environmental and also of ecological areas are often present in most concentrated or typical form in a nucleus somewhere within their limits, and become progressively less marked toward the margins, fading into those characteristic of their neighbors. In some cases, however, their borders are sharp.

We may now at last come to the question of how far ecological or environmental and culture areas are coincident. We may take for our first illustration the Southwest area, cited by Wissler. Here in Arizona and New Mexico is a large region forming a specific type of semi-desert, "bordered on the northeast by plains and mountain forests, but otherwise skirted by a broad belt of real desert."¹ The region is marked by a definite type of climate, has practically throughout a similar topography, and possesses a characteristic flora and fauna. Within this area "all the living Pueblo tribes without exception are found," and since the Pueblo tribes constitute the Southwest culture area, we have thus a coincidence of culture and ecological regions which is complete, so that "Pueblo culture is, therefore, an affair of this semi-desert area and confined to it."²

¹ Wissler, *op. cit.*, p. 213.

² *Ibid.*

If we stop with this statement of the matter it would certainly appear that the correlation was demonstrated. But the demonstration rests on a partial and somewhat inexact presentation of the facts. For, in the first place, although it is true that the *living* peoples exemplifying the Pueblo culture are now confined to this ecological area, *former* peoples of the same cultural type lived rather widely outside its limits, both in the belt of real desert bordering the area in Nevada and Utah and in the mountain forest region to the northwest. Moreover, the ecological area extends southward quite a distance beyond the known limits of the Pueblo culture.¹ It is true that some of the more widely outlying early peoples did not fully exemplify the Pueblo culture and should be regarded as marginal representatives of it, but, nevertheless, they were much closer to the Pueblo culture than to that of the historical desert tribes. The evidence thus appears to show that the older, less fully developed forms of the Pueblo culture had a distribution which was by no means accordant with the ecological area within which its later form took shape. Yet here comes in another factor of possibly large significance. The spread eastward, for example, of the Pueblo culture may well have been blocked not only by ecological changes, but by the fact that in this direction the sedentary agriculturalists were more and more open to the attacks of the nomad Plains tribes. Indeed, the historic shrinking of the area covered by true Pueblo culture was due in very large part to just such attacks. Thus the fact that the present Pueblo peoples are actually limited to a part of an ecological area, may be the result of the interaction of several causes of which environment is only one.

¹ Shelford, V. E., "The Naturalist's Guide to the Americas." Baltimore, 1925; Shreve, F., "A Map of the Vegetation of the United States," *Geog. Rev.*, February, 1917, pp. 119-126.

But more significant is the fact that this very ecological area housed not one but two quite different cultures, for side by side with the sedentary, agricultural, pottery- and textile-making Pueblo peoples, and in historic times occupying by far the larger portion of the whole region, lived the nomadic and semi-nomadic Apache and Navaho, who were largely non-agricultural, made only a little crude pottery, and showed little knowledge of weaving.¹ The Apache tribes were not confined to this area, but extended widely out into the southern Plains. The correlation thus between the ecological area and its culture breaks down in two ways, the boundaries of the ecological area and the Pueblo culture in the past by no means coincide, and the area houses not one but two types of culture. An ecological area thus, though it may be the scene of the development of a characteristic culture, can shelter another and different culture as well.

Such double correlations may be observed in numerous other cases. The ecological region comprising our western Plains, was once the home of nomadic Indians depending primarily upon hunting and possessed of a culture of medium grade; to-day it is occupied by a people of vastly higher culture of a sedentary, agricultural, and industrial type. The Semitic Babylonians developed a highly elaborated culture with intensive irrigation millenia before the beginning of the Christian era. They had great cities, a great commerce, and great wealth; yet their cousins of to-day in the same region are a poor, semi-nomad folk with but slightly developed agriculture, and almost as much below the level of their predecessors as the American population of the Plains is above that of the former Indians. The environment has not changed, the same high develop-

¹ It is only since the introduction of sheep by the Spanish that the Navaho have become proficient weavers.

ment of irrigation is still possible, but the culture now correlated with the environment is quite different from that of old.

A striking instance of the overlapping of two culture areas within a single ecological area affording sharply contrasted opportunities is that of Turkestan. The Aralo-Caspian basin comprises desert and semi-desert areas traversed by a number of river-valleys capable of irrigation. From the earliest times this region has been the seat of two sharply contrasted cultures—that of the nomad pastoralists of the desert and semi-desert, and that of the sedentary agriculturalists and traders of the irrigable valleys. There have been times when the exponents of these two cultures belonged to the same or closely affiliated linguistic and racial groups, and others when they have differed radically in speech as well as in race; but always the double choice of opportunities has led to two strongly differing cultures, the one a part of the pastoral nomad culture of western Siberia and central Asia, the other allied to the city cultures of western Asia and Chinese Turkestan.

Although, therefore, there are many cases where a correlation exists between a culture area and an ecological one, it must be remembered that those elements of any culture which are correlated with its environment constitute simply a choice on the part of the inhabitants from among the various opportunities offered. Two different peoples within the same environment may, therefore, synchronously make different choices, and thus exhibit different cultures, or different choices may be made at different times. It follows, then, that we have no reason to believe that similar environments should necessarily evoke similar cultures. The force of this conclusion will be apparent in the following chapter when we come to discuss the problem of invention.

This factor of choice is thus of great significance in de-

termining the character of the basic traits of culture which any given people will develop in response to environment. What the choice will be is determined by the interaction of four main factors: (1) the cultural status of the people, (2) their cultural antecedents, (3) their cultural contacts, and (4) their national and racial psychology. If, for example, the cultural stage of the people is low they may be quite unable to appreciate and utilize certain of the opportunities presented, of which others later may take advantage. As peoples are not always static they may come as immigrants into a new environment, bringing with them a certain traditional type of culture and habit of mind, a culture pattern whose grooves may be so deep as to inhibit one choice and favor another, or long delay the acceptance of a valuable but unappreciated opportunity. Thus the early Chinese, whose culture was that of a typical inland people, were long in developing any considerable maritime culture after, in the course of their expansion, they had reached the sea. We shall have occasion to observe later the considerable part played by the cultural pattern in the growth of culture. Here, as a factor in determining the character of a people's reaction to a new environment, it is evident that it may be of much significance.

The third factor influencing choice among the opportunities offered by environment is that of culture contacts or diffusion. If a people make use of a particular opportunity or group of opportunities, such, for example, as the use of metals, this use, this group of associated traits, will under normal circumstances tend to be copied by and to diffuse among their neighbors living under generally similar conditions. So that, due primarily not to their own reaction to their environment, but more as a result of suggestion from without, a particular culture trait related to the environment may be developed.

The last factor mentioned, that of national or racial

psychology, is one regarding whose very existence there is much difference of opinion, and which is at any rate probably of minor importance as compared with the others. Superficially, at least, there appear to be certain aptitudes, habits of mind, temperaments which are not mere culture patterns, that are associated with whole national or racial groups, and color their culture or cultures throughout. As we shall have occasion to consider this question in the following chapter it will be sufficient here to admit the possibility of its existence as a real, if relatively minor, feature in this matter of choice.

As has been suggested, the extent of the dependence of culture on environment and the closeness of the correlation between them is greatest in the lower stages of cultural growth. The Tasmanian in the large majority of the traits of his culture showed obvious dependence on his environment. The Inca, the Roman, the modern European, or American were and are less dependent on it. The gradual emancipation of culture from environmental control is one of its striking characteristics and, although escape is never by any means complete, the gradual loosening of the bond has consequences of much importance. Some of the reasons for this significant change are, at least in part, as we shall see in the following chapter, dependent on a change in the character of inventions.

From this rapid survey of the function, importance, and limitations of environment in conditioning and moulding human culture, we have seen that although not as omnipotent or invariable in its effects as some enthusiasts would have it, it is nevertheless fundamental in its importance. It sometimes conditions but more often moulds culture in various ways and in varying degree. It affects directly many of the basic material traits and indirectly extends its influence into the social and religious spheres. Yet there

are always many aspects of culture which lie beyond its reach. Environment erects but few real barriers. With few exceptions, it sets before man opportunities which he may take, rather than issues commands which he must obey. Such mandatory aspects, however, as it has, and such restrictions as it tends to impose, grow weaker with every increase in cultural development. The very beginnings of culture depend on man's ability to utilize these opportunities, and the extent to which and the manner in which they are utilized by any people, in large measure marks the stage of culture which they have attained. Any utilization of the opportunities offered by environment is, in the first instance, the result of discovery or of invention, and these two processes, to which we may now turn attention, thus stand out as basic in the origin and growth of civilization.

CHAPTER II

DISCOVERY AND INVENTION

ONE of the long-standing controversies which has developed among students of the history of culture, is that relating to the explanation of similar cultural traits which occur in widely separated areas. One school, which may be called the Diffusionist, holds that culture traits have been discovered or invented but once, and that from that single instance all other examples of its occurrence have been derived by means of borrowing or diffusion. According to this view pottery is an invention made early in man's history at some definite time and place, and from that centre of origin all known cases of the use of pottery have been derived, it being "unthinkable," according to this view, that such invention could ever have been made twice. The opposed school, who rest their case on the theory of so-called "psychic unity," hold in conformity with this that the human mind is everywhere so fundamentally alike in its working, that similar stimuli will produce or tend to produce similar reactions. On this basis there is no reason to doubt the possibility, even the considerable probability, of independent invention, since similar environments will tend to produce similar results. It is, however, admitted that this applies only in the case of inventions that are not too complex. Where the complexity or specialization of the invention is considerable, the probability of independent exact duplication becomes negligible. In the view of this school, then, pottery, which may be classed as a simple invention, may well have been invented several times in sev-

eral places quite independently, and the wide distribution of the trait is to be accounted for, not as the result of diffusion from a single point of origin, but as due to a spread from various independent centres.

We shall have occasion later to consider at greater length these two opposed points of view, and may leave the decision between them until that time. Here, in the development of our general argument, it is only necessary to call attention to the fact that whatever be the outcome of the controversy, it is indisputable that every culture trait must have arisen by discovery or invention at least once. There has always and necessarily been a first time. Discovery or invention thus being concerned in the very origins of culture, it behooves us to consider the nature of these processes which are basic to its rise.

It is sometimes difficult to draw a hard and fast line between discovery and invention, but for the purposes of this discussion we may make a primary distinction on the basis of the presence or absence of purpose. Discovery would then be limited to the unpremeditated finding of something new, whereas invention might be defined as purposeful discovery. It is clear that the two forms grade into each other by imperceptible steps, ranging between the purely accidental stumbling upon something previously unknown, through a more or less painstaking search for the same, to the purposeful experimenting with existing materials leading to the creation of a wholly new thing, which would never have existed but for this conscious human endeavor. The accidental discovery of a new edible plant might serve as an example of the first; the search for a new and stronger kind of vegetable fibre would illustrate the second; whereas the utilization of the elasticity of wood in the construction of the bow would represent the third. True invention thus differs strikingly from discovery in that its

result is actually a creation of something new; in discovery the thing discovered was already existent. We might then more accurately redefine discovery as the accidental finding of something previously unobserved, whereas invention is the purposeful creation of something radically new. It must, of course, not be forgotten that both discovery and invention may have non-material as well as material results, for one may chance upon a new idea or invent a new philosophy.

Having defined our terms we may next proceed to a discussion of the processes involved. For discovery in its purest form there are three conditions precedent, (1) opportunity, (2) observation, and (3) appreciation plus imagination, in other words a measure of genius. It is in the first place obvious that before a thing can be discovered it must exist, *i. e.*, the environment must present the opportunity. The Eskimo could never have discovered corn or cotton or the process of fermentation, because the environment did not provide the opportunity. The range of possible discovery, at least in the material field, is thus limited by environment, which thus at the outset asserts its fundamental importance.

Given the opportunity, it is necessary that it should be observed as a separate and individual thing. Native copper in its rocky matrix, or the growing potato plant, must have been passed by countless times before the copper was really observed, or the fact that the plant had edible tubers was noted. But the observation remains sterile unless it is accompanied by appreciation and imagination; until some genius, having observed the thing or phenomenon, realizes its potentialities. Only then does discovery really occur. Glass, for example, seems probably to have been a discovery. Hundreds, perhaps thousands of times, men had happened to build fires on clean sand. A hard, shining sub-

stance would sometimes be found in the ashes, due to the alkali from these having united with the silica of the sand, producing glass. But not until some one man, observing it, had seen its possibilities as a material from which to make beads or other ornaments, or with which the surface of pottery could be made lustrous and smooth, did the discovery of glass or glaze occur. The opportunity had been present wherever hot fires had been kindled on sandy soil, the accidental product had doubtless been observed by hundreds; it required the spark of genius to appreciate the possibilities of what was seen. Once discovered, the process of glass-making entered on the inventive stage, and by trial and experimentation has developed to all its perfection and multiform varieties of to-day. But the invention of the various processes of glass-making rests on the discovery of glass.

For discovery in the first instance there is then requisite the triad of opportunity, observation, and genius. To these must be added, however, for all but the simplest cases, one or both of the additional factors of curiosity and need. The discovery of a new food—such as the oyster, for example—would be long delayed unless some one had the curiosity and courage to taste it; the discovery of metals goes back doubtless to some one's curious experimenting with a new and peculiar sort of stone. Man, like other animals, is naturally curious, and to his inborn curiosity in aimless experimenting with new things the bulk of his discoveries are probably due.

Need, however, introduces a factor of paramount importance and carries us a long ways toward invention. For although the casual discovery of a new food or material may lead to its use, if the foods already utilized are insufficient and there is a need for new sources of supply, a powerful spur is added to curiosity, and purposeful search

is likely to ensue. Necessity is indeed often the mother of invention, and is likewise the parent of discovery sometimes as well. With the strengthening of this factor of need we pass more and more definitely into the sphere of invention, in which the need is met, not by the appropriation to use of a hitherto unused thing, but by the creation of something new and fundamentally better.

If now we look a little deeper into the problem we see that a distinction must be made between the slow refinement or improvement of an implement or process and a *per saltum* creation of something entirely new.¹ A slight improvement in an implement or process may occur accidentally and unpremeditatedly. During the whole period of man's history when articles were made by hand and not by machine, no two implements of the same sort were necessarily exactly alike. The bow made by one maker varied slightly in proportions or in small details of construction from that made by another; even those made by the same maker were not always identical. Accidental variations of this sort, or modifications due to use, both of which, moreover, may be cumulative, may result in improved efficiency or handiness, and thus become perpetuated in a new form of instrument which is thus, in the strict sense of the term, not an invention. The example given by Harrison of the mortar and pestle seems an excellent one, for in this, by a series of imperceptible variations, the hollow mortar and shaped pestle may have arisen from two ordinary stones. Here the perpetuation of the hollowed form of the mortar, due to long use of an originally flat stone, is particularly probable.

True invention, on the other hand, proceeds *per saltum*;

¹ For an interesting discussion of the whole question of invention, see Harrison, H. S., "Inventions; Obtrusive, Directional, and Independent," *Man*, vol. 26, No. 74; "Variations and Mutations in Invention," ditto, No. 101; "Analysis and Factors of Invention," ditto, vol. 27, No. 28.

it is, as Harrison¹ calls it, following biological analogies, a mutation. The final result may not, indeed, be reached in a single step, but be attained by a series of intermediate stages, some of which may even be the result of accidental variations; the final stage, however, is taken at a leap. There are certain inventions, however, which by their very nature are achieved without any possible intermediate steps, as, for example, in the case of the oar. Here there are no obvious stages between the paddle which is pushed and the oar which is pulled, unless one can regard sculling as in some measure a transition from paddling to rowing.

In his discussion of the process of invention, Harrison calls attention to the fact that "mutations" or inventions may often be described or explained as the transfer of a chance variation to new conditions or a new medium, and that in more advanced types of invention we may have a transfer of mutations themselves. In this connection it may be noted that, in so far as implements are concerned, the more or less abrupt change which is involved in invention may follow any one of four different lines, for it may be in the material used, in the form produced, in the agency employed, or in the result to be attained. In his discussion the author just referred to insists on the fundamental difference in character between invention at the present day and in the earlier stages of culture, and he practically denies the existence in the latter of any purposeful striving. Invention in the beginning was, he says, obtrusive, in that the new idea or method thrust itself on man's attention by accident. This is tantamount to saying that in the earlier stages of culture there was no invention, only discovery. The purposive seeking and striving or, as he calls it, "directional invention" came, he believes, only later, and has not yet wholly displaced the older form.

¹ *Man*, vol. 26, No. 74.

Now there can be no doubt but that in earlier times discovery played relatively to invention a larger part than to-day, but to my mind it is very doubtful if invention was wholly absent. Purposive striving must from Palæolithic times have been present, although far more spasmodic and less patiently persistent than to-day. For the intensive application to invention which has been so characteristic of our modern culture during the last century is something quite unprecedented, so that our conception of the inventive process as it operated in the early stages of culture tends to be falsely colored by it. If we wish to picture the character of invention among savage and barbarous peoples we must remember that the needs which served as stimuli were relatively and even absolutely few, so that the probable directions of search were very limited. Further, that invention was not a vocation, hardly even an avocation, but rather an occasional, spasmodic interest on the part of men whose attention and effort were mainly absorbed in the simple routine of life. Lastly, that the inventive steps were probably largely of the nature of small mutations, to use Harrison's term, except for a small number of striking cases where the invention was completed virtually in a single step. We are to conceive invention, then, in its early stages as necessarily a slow, halting process, occasionally enlivened by a dramatically sudden advance, its field defined by the local needs, and its achievements depending upon the presence of the necessary genius.

This factor of genius is basic to all invention. It is unnecessary for us here to make any elaborate attempt at its analysis, and sufficient to note that genius may vary in its character, its grade, and its frequency. The first refers to the character of the field in which genius is exercised, as, for example, the mechanical, the æsthetic, or the intellectual. The genius of one man enables him to devise

a new tool, that of another to paint a picture or compose a new song, that of a third to invent a new philosophy or religion. Usually the genius possessed by a man lies in one particular field, for only rarely do we get a da Vinci. As genius may vary in its character, so obviously it may differ in degree, from attainments but little above the average to the great geniuses of all time. Lastly, genius may be more or less prolific, ranging from the man who has one invention to his credit to him whose mind seethes with new ideas.

We have here been considering the individual whose genius may be of varying character and grade and more or less prolific. But in large measure the same holds true for tribes, nations, and for races as well. For these differ from each other mentally and intellectually not so much in the average as in the relative frequency among them of men above the average grade. As Hankins¹ has shown very ably, in spite of the claims made by some for the equality of ability of all peoples, it is impossible to doubt their variability in the production of genius, both as to numbers and grade.² It is true, for example, that there have been Negroes who have shown marked ability, but they have been few, and although these stand far above the average Negro and indeed above the average white, they are nevertheless far below the heights which the geniuses of the white race have attained. If we admit then, as I believe we must, that peoples like individuals vary in grade and frequency of genius, and perhaps as well in its character, we see at once how far-reaching the implications of this fact are as regards invention. For, confronted by the same opportunities, one people with a higher grade and frequency of genius than the other will be able to take advantage of them to a correspondingly greater degree.

¹ Hankins, F. H., "The Racial Basis of Civilization," New York, 1926.

² See also Porteous, S. D., and Babcock, M. E., "Temperament and Race." Boston, 1926.

Genius then is variable, and so obviously are needs, and in the same way, for they differ in character, in intensity, and in number. There are physical needs for food, sex relations, self-preservation, clothing, shelter, and health; there are social needs for authority and leadership, for regulating marriage, political association, and conduct; there are economic needs for exchange of products and trade; there are æsthetic needs for ornament, for beauty of shape or sound; there are intellectual and religious needs for knowledge, for an explanation of the visible universe and of life, and for faith by which to live. Every aspect of man's life has its needs. All these various kinds of needs vary in intensity, for some may be imperative, whereas others may be at least temporarily of little weight. The purely physical needs for food, sex relations and self-preservation stand out as the most imperative, and from this extreme they grade down to the mere desire to gratify some passing whim. For those which are imperative man will sacrifice all the rest, and it is these which must first be met, if he is to survive. Yet dominant though these are, it is clear that all the other categories of needs very early asserted their importance, for we know of no people without some social groupings or regulations, some system of barter, some expression of æsthetic impulse and some religious faith. And although the means of meeting some of these needs are intangible and can have left no record, we know, from the methods of burial and marvellous cave-paintings, that as far back at least as the later Palæolithic period, æsthetic and religious needs were already strong. At times the relative intensity of needs may be quite reversed, as where the religious needs of a high-caste Brahmin to preserve himself from contamination by contact with a low-caste man, will even lead him to sacrifice

life itself when starving, rather than take food from untouchable hands.

And as needs thus vary in character and intensity, so also do they in number. For the needs felt by man in the earlier stages of culture are few in comparison to those we feel in our modern civilization. Every increase in the complexity of culture multiplies the needs of man, a fact which is the justification of the saying that the luxuries of one generation become the necessities of the next. The whole process is in large degree a vicious circle in that the more complex the culture, the greater are the number of needs, and the satisfaction of these needs then tends to add still further to the complexities of life. As culture becomes more complex the demand for invention becomes greater. It may be noted, further, that in so far as needs are the spur of invention, since no one area supplies all kinds of needs, all primary inventions are not likely to have been made in any one region.

Now needs which are thus variable in kind, intensity, and number, arise either through the environment or as a result of the growing density of population. To some extent the most imperative of the physical needs—food, sex relations and self-preservation—lie outside their control, yet it is fair to say that in some measure all needs are rooted in one or the other of these factors. There is need for food everywhere, but the need is more intense in the desert than in a fertile land, or among a dense population pressing upon its food-supply than in a sparse one in a rich environment. Within a given environment and density of population the needs may remain substantially constant in character and intensity for long periods. But a change in environment or density of population gives rise at once to new needs, or to an intensification of the old. The changes in environment may be secular, such as those occurring in Europe in

Palæolithic and early Neolithic times, or those of gradual dessication which are supposed to have taken place in various parts of the world in historic times. More commonly, however, they come about through migrations and changes of habitat, as a result of a people moving from one environment to another.

Some writers¹ persistently deny that popular movements on any considerable scale have occurred during the last few thousand years, and insist further that migrations have played no important part in the development of culture. It is difficult to understand such a wilful blindness to historical and ascertained facts. The wholesale shifting of peoples which took place in Europe in the early centuries of the Christian era and just before are commonplaces of every school boy, and to deny the similar great drifts of population in Asia, dating back millenia before this and coming down almost to the present day, is to admit one's ignorance of the elements of her history. For Africa, Oceania, and the whole of the New World, although we have no historical records, we have, nevertheless, a great body of well-authenticated evidence demonstrating that the same phenomenon of wide and significant migration was equally true there. Sumerian and Kassite, Hindu and Persian, Phrygian and Gaul, to name but a few of the more obvious examples, all changed their environments radically as a result of extended migrations. The same is true for Turk and Yakut, Chinese, Siamese, Karen, and Maori in the Old World, or for Cheyenne and Navaho, Nahua, Araucanian and Carib in the New. And if we go back of all history and tradition to the period when man was first spreading over the world, it is obvious that migration and change in environment were of necessity dominant and prevailing factors. Changes in environment through popular movements, and the consequent development of new needs,

¹ *E. g.*, Wissler.

has in fact always been going on, and must have been most frequent and intense in just that early period when culture was slowly being forged. The process is, of course, far from ended, for the last century has seen the greatest migration in all history here in the United States.

It is hardly necessary to go at length into any argument in proof of the reality of changes in the density of population. No one, I think, would deny that such changes occur, and for a variety of causes. Famine, epidemics, or war, for example, may bring about great and sudden reductions in number; immigration or invasion may with equal suddenness lead to an increase. Slow changes in either direction are obviously more common, and it is equally clear that under normal circumstances this slow change is usually an increase. That concentrations occur with the development of city life is patent, and the tremendous problems and complex needs of great urban communities are constantly demanding our attention to-day.

The needs which arise as a result of increased density of population are often fully as much social and economic as they are material; police and banks are as necessary as water-supply and electric light. And although our modern needs arising from density of population are vastly more numerous and complex, we must not forget that the small and even temporary aggregations of barbarous and semi-civilized folk give rise to similar although far simpler problems. The concentration of population in one of the great communal pueblos of the Southwest was as great as in many of our smaller urban populations of to-day, and the density attained at Tenochtitlan, the Aztec capital, or the irrigated valleys of coastal Peru or of Turkestan, to say nothing of early Egypt, Babylonia, India, and China, was such as to give rise to many and often imperative needs. Even among quite primitive folk, the occasions of temporary gatherings

for ceremonial or festival purposes, bringing together some hundreds or thousands of persons, entailed many special needs of supply, organization, and protection that were met in various ways; and water-supply and sewage disposal, street-cleaning and street-lighting, markets for food and police protection, were urban needs in Tenochtitlan as they are in London, Paris, or New York.

We have seen that needs arise through environment or changing environment or from a growing density of population. They may also arise through diffusion, in that, as a result of influence from without, a need may be either called into being or one latent so stimulated, that means for its satisfaction have to be invented.

Needs have, it is true, served as the primary stimulus for invention. We cannot, however, for any given need predict with any certainty the lines which invention designed to satisfy it will follow. Even if the environment and its opportunities are known, it is at best only possible to set certain limits and say that particular fields of invention are ruled out. To give an absurdly extreme example, we may say with complete confidence that the Eskimo, needing some means of illumination during the long arctic night, never could have invented the electric light. We can be certain of this because we know that he lacked completely all the mechanical and electrical knowledge and equipment which alone would make such an invention possible. To put the matter in another way, the inventor can work only with the tools, *i. e.*, the knowledge and the materials, he possesses. If, with this obvious fact in mind, we turn back to the problem of predicting from a given need how it will be met by invention, we see that it has an obvious application. For the simpler a culture is, the fewer are the materials and the narrower is the range of knowledge of which the inventor can be possessed, so that as a conse-

quence the possibilities of invention are more limited. Where accumulated knowledge is meagre and materials few, the possible lines of inventive advance may be so limited that a prediction along the lines of two or three alternatives may be made with some confidence. But with a rise in cultural level and the concomitant enlargement of knowledge, the probable error of prediction rapidly increases as the number of possible ways open to invention are greatly multiplied. Briefly, simple needs are met by simple knowledge only in simple ways. From this point of view, therefore, we would have good reason to expect that the simpler inventions may well have been made more than once. For if in the lower grades of culture a given simple need can only be met by two or possibly three simple inventions, then if the need is met there is little choice and the same device may be invented in several different places.

The process of invention rests, as I have tried to show, on the triad of genius, need, and opportunity. That genius was variable in character, in grade, and in frequency we have seen, and that needs differ in kind, in intensity, in number, and in origin we have also found to be true. There remains opportunity, and this obviously is equally anything but uniform. For, in the first place, opportunities fall into two clearly contrasted classes, those, on the one hand, which are universal, and, on the other, those which are local. Opportunities which belong to the first class are universal in that they are afforded by every environment, and are therefore open to any one anywhere. They are afforded by universal laws or principles, such as gravitation, friction, or elasticity, or by the presence of universal or almost universal agents, such as wind, water, heat, or electricity. Thus, so far as environment is concerned, the simple balance might have been invented by any people anywhere, since gravity is as effective in one place as in another. Similarly,

the bow, depending as it does on elasticity, could have been invented anywhere that elastic materials were available, and, like the balance, might have been invented therefore several times independently. So, again, the sail might have been invented wherever lake- or sea-borne craft were in use.

Local opportunities, on the other hand, are those afforded only by particular environments, or in extreme cases by but a single one. Thus the opportunity to develop means of navigation is afforded only by areas adjacent to seas or lakes or which contain navigable rivers; the opportunity to invent metallurgy only by environments which supply available ores. A more extreme case, which will be referred to again later,¹ is that of the blow-gun, there being but two regions in the world—southeast Asia and the Amazon basin—where species of bamboo or reed grow which supply the necessary tube from which to make the primitive form of the implement. One of the most striking examples of extremely local opportunity is that afforded by the peculiar nodes or tide-rips, due to the intersection of the ripples formed on a gigantic scale by the rapid-flowing ocean currents, in the Marshall Islands in Micronesia. These nodes preserve a definite relation to the islands which cause them, and are used by the people as a means of finding their way, charts being constructed on the basis of the nodes, which enable the natives to navigate with certainty throughout the archipelago. The opportunity is absolutely unique, for nowhere else in the world does a rapid ocean current flow through a group of islands rising precipitously from great depths, a condition necessary for the production of the phenomenon. The significance of this case will come up again in another connection later, but one may here at least emphasize the fact that this unique opportunity offered to man's genius was not neglected, but utilized in a way to excite admiration.

¹ Pages 121, 229.

The distinction between these two different kinds of opportunities, the universal and the local, has, as may be seen, a definite bearing on the controversy in regard to multiple independent invention. For it would seem to follow that inventions based on opportunities which are universal have a greater chance of being duplicated than those arising from opportunities which are more or less local.

Opportunities further differ not only in the respects just noted, but also in that they may be either obtrusive or unobtrusive. Thus clay, as affording an opportunity for the invention of pottery, is not only wide-spread, but caked and dried by the sun or baked by the fire, obtrudes itself in a dozen different ways on man's attention. It invites the genius to take advantage of it. The peculiar nodes on which the Marshall Islanders base their sailing-charts, on the other hand, are extremely unobtrusive and elusive, and, indeed, require a rather specially trained eye to detect. Here again the differences have significance, for, other things being equal, inventions based on opportunities which are patent are more likely to recur independently than those which rest on opportunities which are obscure.

Lastly, opportunities differ in their importance or serviceability. That afforded, for example, by fur-bearing animals to arctic peoples for the invention of tailored clothing, is great, for by it they are enabled to endure with safety and comfort the climatic conditions under which they live. The same opportunity is offered to many of the dwellers in the tropics, but in this case the opportunity is negligible, for the invention based upon it would be useless. Clay and its opportunity for the invention of pottery is important for a sedentary people, but for roving nomads its importance is small, since pottery, owing to its fragility, is of little use to them.

The three factors, thus, upon which invention is mainly

based—opportunity, need, and genius—are all variables. Opportunities vary in importance, obviousness, and wideness of distribution; needs differ in kind, intensity, and number; and genius varies in its character, grade, and frequency. Since culture is, at least in origin, based upon invention, and invention is based on factors no one of which is constant, the great diversity which culture exhibits is not surprising.

I have tried to show that the process of invention, which lies at the very basis of the origins of culture and is one of the most potent factors in its growth, rested in the main upon the triad of opportunity, need, and genius. We may now examine the product of the process, *i. e.*, inventions themselves, to see how closely, in the culture of different peoples, they are actually correlated with their efficient causes.

As regards opportunities, it is at once apparent that the correlation ranges between wide limits, for we may have a tribe of very moderate culture, living in an environment replete with opportunities, yet having few inventions based upon them; whereas another tribe, perhaps of not greatly superior development, may have as a habitat an area with few natural opportunities, but have made the most of these. The Yaghan of western Tierra del Fuego lived in an environment where, to be sure, the opportunities offered were not very abundant, yet their very simple culture showed a low correlation between its inventions and even these meagre opportunities. The abundance of seals and sea-otter and the availability of fox-skins and, to some extent, those of the guanaco, which was abundant in the eastern portion of the island, offered the people the chance to devise warm and efficient clothing to meet the insistent need provided by their environment. Yet the Yaghan had not made even the beginnings along this line, contenting themselves with

merely hanging a sealskin over the windward shoulder. The presence of clay had not led them to the invention and use of pottery, and although available wood was present they seem to have been virtually destitute of the bow. Alluvial gold occurred in some of the streams, but it was not made use of for ornament. No weather-tight form of house of bark or plank was devised. They had harpoons and a few simple traps and serviceable bark canoes, but the net and fish-hook were simple devices which escaped them. We have here, in short, a culture in which the correlation between opportunities and inventions was small. The same may be said of the Tasmanians, who were even destitute of any serviceable canoe, although there were abundant forests and a coast very favorable to the development of maritime activities. They had no knowledge of metals, in spite of the relatively rich deposits of copper and tin which the island affords.

This lack of inventions based on available opportunities, which is found to mark these and other primitive folk, of course also characterized the various cultures of Palæolithic man, and it is apparent, as we compare cultures with the opportunities offered by their environments, that the degree of correlation closely parallels the cultural stage. Primitive and early cultures make but meagre use of their opportunities, and their inventions are few in contrast to the intensive use of practically all available opportunities and the bewildering mass of inventions based upon them, so typical of our modern life. We may say, therefore, it would seem, that the degree of correlation between inventions and opportunities is an index of the grade of culture attained. The problem, however, is not so simple, for although we do indeed find many primitive peoples whose culture evidences few inventions based on opportunities available, there are peoples whom we are accustomed to regard

as far from civilized, whose cultures yet show a high degree of correlation between their inventions and their opportunities.

One of the most striking of these is the case of the Eskimo. Their rigorous arctic environment affords them few of the opportunities which are available in more-favored lands, but gives them, on the other hand, several which are relatively rare or unique. Yet it is remarkable how fully these people have made use of the chances given them. From the skins of the fur-bearing animals of land and sea they have devised probably the most perfect type of clothing for the climatic conditions under which they live. Destitute of wood or bark from which to construct boats or canoes, they developed the remarkably efficient and ingenious skin-covered kayak and open umiak. They further seem to have invented a rudimentary sail, making use, thus, of a universal opportunity which elsewhere in the New World was taken advantage of only very rarely. Still further, they apparently invented the oar, an invention known originally to but few of the world's peoples. In the districts adjoining the Coppermine River they made use of the available native copper, from which by cold hammering they made spear and arrow-points and knives. In Greenland, where chance had brought several large meteorites, they had taken advantage of this sidereal opportunity, and fabricated this malleable alloy of iron and nickel into implements. Lacking over large areas any available wood for fuel, the Eskimo seized upon the opportunity offered by the blubber of the whale and devised the oil-lamp, which served to supply him with a means to cook his food and warm and light his dwelling. Of the peculiar opportunities offered by his environment, and of which he took full advantage, two stand out significantly. The first is the invention of the snow house, the second that of the sledge.

The snow house is obviously an invention possible only in an area where a supply of snow of the requisite consistency was to be had, and where the climate provided long periods of continuous cold. The invention is notable not only because it took advantage of a rather restricted opportunity, but on account of the fact that it also involved the use of the principle of the unsupported dome, *i. e.*, one built without centering. This is an architectural and mechanical invention of remarkably high order, achieved elsewhere in the whole world, so far as I know, only in Mesopotamia and the eastern Mediterranean.

The slight friction which snow offers to a smooth runner afforded the opportunity for the invention of some form of sledge, and not only was so perfect a type devised that it has served as the model for those used by modern arctic travellers, but the dog was developed into a draft animal to haul it. It is true that there was available an opportunity in many ways superior for this purpose, *i. e.*, the caribou or American reindeer, which might have been domesticated as among the arctic peoples of Asia. We shall have occasion in another connection later to recur to the Eskimo's curious failure to make use of this opportunity. Not to prolong the discussion unduly, mention may be made only of one other point. This is the extremely ingenious traps invented by the Eskimo which take advantage of the cold of the arctic winter. The most striking is the coiled and sharpened whalebone spring, frozen in fat, which when swallowed by a wolf and thawing in the stomach, straightens out and pierces its walls.

From the examples given, it will, I think, be evident that the Eskimo make use, to a surprising extent, of inventions based upon the opportunities afforded by their environment, in addition to some depending on principles which are universal. Yet, in spite of this high correlation, their cul-

ture cannot be rated as high in the ordinary sense of the term, yet for its stage it is highly efficient. We may then restate our first conclusion, that a close correlation between inventions and available opportunities is an indication of high culture, by saying that such a correlation shows primarily the high efficiency of the culture, and that whereas the lower cultures may or may not be efficient, a culture to be high must be so.

If we turn next to the relation of inventions to needs we note that in general the correlation is closer the more imperative the need. The need for means of securing food and making fire are so imperative, that inventions of some sort for this purpose are a necessity and may well have been among the earliest if not the earliest made by man. Certain it is that no people are without some form of weapon for securing food, and the number of those having no knowledge of a means for making fire is limited to one or possibly two. Yet, although imperative needs are generally those first met by invention, there are instances in which even in these cases the invention was not made. One may refer again, for example, to the absence of any form of serviceable clothing among the Yaghan, or to the case of the Tasmanian, where a strong if not imperative need for a really serviceable canoe was never met. Despite the exceptions, however, it is true as a rule, that imperative needs and those which are at least important are met by inventions of some kind.

A need, imperative or not, may be a common need, and present in many environments or in all, but the inventions made to meet it may not all solve the problem in the same way. Indeed, the probability is strong that a wide-spread need will be met by several different inventions. For although the need may be the same in differing environments, the opportunities offered will be different, so that what is a

logical and appropriate means of meeting the need in one case may be less so or impossible in another. Thus the Indians of the Plains were in most cases destitute of pottery, and met the need of boiling their food by digging a hole, thrusting down into it a piece of hide, putting in the food and water, and adding hot stones until the broth was done. The California tribes used water-tight baskets for the same purpose. On the other hand some tribes in Indonesia, also devoid of pottery, placed meat and water in a section of green bamboo, which could be set on the fire and would not burn until the contents were thoroughly cooked. All of which leads to the very obvious conclusion that needs are met by inventions which tend to be in harmony with their environment.

It is necessary to point out, however, that this is by no means equivalent to the dictum of the environmentalists that the environment determines the form of the culture. For, in the first place, the tendency is not always wholly fulfilled, as witness the failure of the Yaghan to develop any form of clothing adequate for their climate. In the second place, there is an important connotation in the use of the word harmony. We have seen that identical needs may lead, under different environments, to different inventions; they may also do so under similar or practically identical environments. Thus the Eskimo devised for his shelter the snow house, but the peoples of arctic Siberia invented a cumbrous and curious form of skin bag supported from a framework of poles. The pastoral nomad Mongol and Turkish tribes of inner Asia invented a most ingenious type of felt-covered wooden framework or tent, warm in winter and cool in summer and easily transportable; under essentially identical conditions in Tibet the people made use of loosely woven yak-hair tents, guyed out by poles and ropes, which, although less resistant to heat and cold, are as

easy to transport as the Mongol form. We have thus inventions which are quite different, yet each is in harmony with the environment, to carry out the musical figure, as if one were the third and the other the fifth of the dominant environmental note. Therefore, although in similar environments similar needs may *tend* to be met by similar inventions, the rule is far from absolute; yet however different the response may be in some cases, it is one which shows a harmony of some sort with its environment.

In discussing opportunities, we saw that the correlation between them and inventions was usually greater the higher the stage of culture of the people, although there might, nevertheless, be a high correlation in a culture of medium advancement, which then marked it as one of high efficiency. The same holds true as regards inventions and needs, yet the situations are not exactly parallel. For although a people of low culture may have an environment which affords a wealth of opportunities of which they take but partial advantage, their needs may be few, so that if these simple needs are met, the correlation of inventions and needs may be high. Needs, both material and non-material, increase rapidly in numbers the higher we rise in the cultural scale, until the needs in our modern civilization have become almost numberless, and are met by an equally innumerable array of inventions.

Any discussion of the correlation between inventions and genius meets at the outset the almost insuperable difficulty that, unlike opportunities and needs, genius cannot be independently measured. The opportunities which a given environment furnishes may be determined with considerable exactness; the needs of a people may be estimated with some degree of success; but no measure of a people's genius is yet possible save that afforded by those very inventions whose correlation with genius is what we seek. It is true

that we may perhaps form a rough estimate of the frequency of genius among a people, by the number of men of genius which it has produced, and of its quality and grade, by their fields of productivity and relative greatness. But at best such an estimate rests to a large extent on this or that estimator's personal opinion as to where the level of genius begins, and it obviously omits from consideration the countless persons of actual genius who for one reason or another never had the chance to demonstrate it. Further, such an estimate, precarious as it is, can be made only for the few peoples for whom adequate written records exist, and for the great mass of the world's peoples is impossible.

We cannot, then, estimate the genius of a people, either its frequency or its character or grade, save by its products. Judged by this standard, there *seems* to be a very real and often very great difference between peoples, nations, and races, so that, for example, the inventive productivity of the Negro and other dark-skinned races is far inferior to that of the others. One of the many difficulties, however, in any attempt to judge even by the products, is that in many cases we cannot be sure whether a trait in use by a people, or whole group of peoples, was actually invented by them or not. The place of origin of most of the great basic inventions is utterly unknown. At first thought, it might seem that in the case of civilized peoples there was one method of getting some light on the matter, *i. e.*, by a comparison of the actual inventive productivity of genius as revealed in the number of patents taken out in different countries. For example, if one calculates the number of patents issued, per thousand of population, there is a great difference between, say, Spain and Portugal, with 3.5 and 2.0 per thousand, respectively, and France, Great Britain, and the United States, with 17.4, 14.6, and 13.5. Yet the

significance of such figures is probably small because of the many evident sources of error in such a simple comparison. Where Sweden shows but 0.9 and neighboring Norway shows 15.0, it is clear that no such means will suffice. Nevertheless, the history of the inventive advances of the last century shows that the various European peoples have contributed by no means equally to the present result. And although there are numerous reasons for this inequality, it is so pronounced that when allowances are made for all these other factors, there seems to remain a residuum to show national differences in respect to inventive genius.

We have seen that culture, in its origins at least, and to a large degree in its development, rests upon invention, and that invention is mainly based upon the three factors of opportunity, need, and genius. We have also seen that each of these factors is a variable, and further that the correlation between each of the first two at least (and probably of the third) and inventions was also in no sense fixed. The great variability which thus marks the process and the products of invention explains in part the great diversity of human culture, but in part only, for much of the variety is due to diffusion, a phenomenon to whose consideration we must now turn. Before doing so, however, there are two points which may be again emphasized. The first is, that although opportunity, need, and genius are all variable, it is far from impossible that approximate duplication of conditions should now and then, here and there occur, and that under such similarity of conditions similar inventions should arise. The more universal the opportunity, and the simpler and more wide-spread the need, the lower is the grade of genius required to achieve an invention to meet it. And, since the lower grades of genius are inevitably more frequent than the higher, we might expect that simple needs which can be satisfied by wide-spread opportunities should

occasionally be met by similar means. Conversely, the more restricted the opportunity or the more complex the need, the higher is the grade of genius and the greater the store of accumulated knowledge requisite to solve the problem, and the less likely it is to be solved in the same way. The insistence of the extreme diffusionists, that independent invention is not only impossible but unthinkable, seems, therefore, illogical. We shall have occasion to discuss this question at greater length in the chapter on culture parallels, but it seemed desirable to point out here again that, as a corollary of our conclusions as to the process of invention, it was to be expected that duplication of simple inventions might logically occur.

The second point is one alluded to a moment ago. What right have we to assume, as we did in speaking, for example, of the Eskimo, that the traits in use by them were of their own invention? May not the traits have been actually invented by some other people, and merely have been adopted and taken over by the Eskimo? How do we know, in the case of any people without records, how large a part or what part of their culture is rightfully to be attributed to their own genius, needs, and opportunities? These questions are entirely justified. It is by no means certain that all the traits referred to as Eskimo inventions, for example, were actually invented by them. The problems of invention are difficult enough in themselves, but they are greatly complicated if we are not sure whether the traits considered are properly to be attributed to a particular people. That the origin of every trait lies in invention is perfectly true, but many peoples have come to possess a trait who never invented it. The whole process of diffusion here comes into play, and to it we must now give attention.

CHAPTER III

PRIMARY DIFFUSION

A NEW discovery or invention is, in the vast majority of cases, made by an individual. There are of course instances, particularly in our modern highly organized type of invention, in which several individuals co-operate, but from the nature of the case such instances must in earlier times have been few. We are therefore undoubtedly justified in treating discoveries and inventions as essentially one-man affairs.

Now a discovery or invention, once it is made, is without result and sterile unless it is adopted. Without its diffusion beyond the discoverer or inventor the new trait remains merely a personal eccentricity, interesting or amusing perhaps, but not significant. Diffusion thus begins with the discoverer or inventor, and the adoption and spread of the new trait among the members of his own group, and within the limits of his own culture area, constitute what may be called primary diffusion.

In its origin the new trait rested in the main, as we have seen, upon the triad of opportunity, need, and genius, and all three of these are also in some degree factors in diffusion. The opportunities and needs of the inventor's or discoverer's own group are the same as his own, and a certain amount of appreciation and imagination, *i. e.*, genius, is needed for them to see the value of the new trait and adopt it. But here new elements enter in, since appreciation may be hastened and stimulated by demonstration and persuasion, or by the powerful influences of imitation and fashion. In the first case there is involved the factor of

personality, for a strong personality on the part of the inventor may be of material aid in convincing others of the value of his invention. The potency of fashion may also be extremely great in primary diffusion, as it unquestionably is in secondary diffusion beyond the inventor's group. A new trait if adopted by a person or persons of prominence in the group may become fashionable as a result; if the Prince of Wales turns down his hat brim thousands of other people will follow suit.

A very important feature of the part played by fashion in the diffusion of a trait, is that under its influence a trait may diffuse independently of any real or rational need and even in the face of it. The trait then spreads under what has been termed irrational sanction. The significance of this is patent, for a useless or even harmful trait may thus be adopted and diffuse rapidly, whereas a useful and beneficial one may not. Although the influence of fashion is usually more easily traceable in secondary than in primary diffusion (since the trait may not be observed until after it has been already adopted by the group) its importance in the latter is undeniable.

Adoption of the new trait may fail, however, for various reasons. It may fail if the need which is satisfied by the trait is weak, for under such circumstances the urge toward adoption is only feeble and, unless reinforced by fashion, may be unable to overcome the people's inertia. A frequent cause for such a weakness of need lies in the existence of an established trait which equally or almost equally serves the need. The fish-hook, for example, if invented among a people already skilful in the use of net and spears, might find itself in this position. The new trait may fail of adoption also if its value is not appreciated by the group. The history of modern invention is full of instances of an

inventor vainly trying to interest others in his device, and struggling to make them see its possibilities. Although the cases are not wholly comparable, yet similar failure to realize the value of a new discovery or invention must often have occurred in the earlier stages of human culture.

It is a requisite for the adoption of a new trait that it shall be commensurate with the culture of the group, and shall not entail for its successful use too many concomitant changes and readjustments of other elements in the people's life. In other words, the invention or discovery must not, as the saying is, be too greatly in advance of its time; if it is, it must have immense dynamic force to survive. As an example we may take the invention of the *æolipile* by Hero of Alexandria, in the second century B. C. This consisted of a hollow metallic sphere mounted on a vertical axis. At two opposite points on the equator of this globe were attached pipes extending radially outward and bent at their ends at right angles, but in opposite directions. When water was put into the sphere and a fire kindled beneath, the water boiled, and the steam escaping in jets from the two nozzles, caused the sphere to revolve in the same way as a lawn-sprinkler is made to turn by jets of water. It is clear that this was in principle a reaction turbine, and was capable of developing considerable power which could be applied to machinery of various kinds. The invention remained sterile, however, and never was anything but a toy which was soon practically forgotten. The Mediterranean world of the second century B. C. was not ready for the use of steam-power. The necessary development of machinery to be run by such an invention lay a millenium or more ahead.

An added obstacle to the adoption of a new trait, and one of large significance, lies in the conservatism with which people adhere to their customs, their conventional culture

pattern. If they have long been accustomed to do a thing in a certain way, habit and conservatism may, if they are strong, inhibit the adoption of a new way or trait, or at least greatly retard its acceptance. There is a wide difference in respect to conservatism between different peoples, some being extraordinarily loath to change from established customs, others ready and curious to try anything new. We may well expect, therefore, that inventions or discoveries of real value have often failed of acceptance on these grounds.

But it must also be noted that even more striking perhaps than in the case of peoples, individuals show wide variations in conservatism and inertia. We all know the man who, despite the manifest advantages of the safety-razor, still clings to the use of the old-fashioned form. He is used to it, and, for all the jesting of his friends, persists in adhering to the old trait. This individual variation in conservatism within the group, leads to the fact that the adoption of the new discovery or invention is not, even in the beginning, uniform and regularly progressive. It spreads erratically and unpredictably, faster among this portion of the group than among that, and individuals may long survive who are still recalcitrant after the group as a whole is committed to the new trait. Another cause of asymmetry in diffusion lies in differences in environment, which may even locally be sufficient to slow up the diffusion in one direction.

It is unnecessary for our purposes to go into great detail in regard to the mechanism of diffusion itself. The trait spreads as a result of intervillage, intergroup, or intertribal contacts, based on ordinary friendly relations, or on trade or social or religious ceremonials. It may also be spread by intermarriage, or in some cases by individual or family migration from one portion of the group or culture

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area to another. War, with its attendant conquests and captives, may also play a part in primary diffusion, although its significance is likely to be rather greater in the wider diffusion of the secondary type.

Sooner or later, however, if the conditions are favorable, the new trait will have become established as part of the culture of the group, and secondary diffusion beyond the group of origin may begin. But although we have traced the progress of the trait from its birth as the discovery or invention of an individual, to its inclusion as a new element within the fabric of the culture of his group, we are not yet ready to follow it on its adventures further afield, for we must first trace its subsequent history within the group.

The outstanding feature of this history is that the trait, once accepted, is neither immutable nor immortal. If the group is isolated and remains stationary in the same environment, the trait may long persist essentially unchanged. Yet even in such case there is always the probability of its modification and slow improvement as a result of accidental variation, let alone the chance of "mutation" or further steps in invention. So in time the original trait may become considerably changed. It is true that we have evidence of various cases where traits have remained virtually unaltered for thousands of years, but the conditions favoring such immutability are relatively rare. A striking instance of such long persistence of traits seems to be afforded by archæological materials from California. Here, in the Potter Creek caves, whose deposits date from early Quaternary times, have been found certain bone objects, assumed to be of human manufacture, which are practically identical with bone tools occurring in the shell-heaps of the San Francisco Bay region, which unquestionably considerably post-date the deposit in the caves. As the shell-heaps have been estimated to have an age of some 1,000 years as a minimum,

we seem to have evidence thus of a type of implement being in continuous use without notable change for perhaps 2,000 or 3,000 years. During Palæolithic times there were many forms of stone implements which must have kept their form for even longer periods, and we must assume that many of the simple traits of such extremely isolated folk as the Tasmanians had remained essentially unchanged probably for millenia.

The trait may not only be changed in the course of time; it may be superseded by a new trait and as a result die away and disappear, or it may do so without being superseded. The Smith Sound Eskimo were a group living on the northern portion of the west coast of Greenland. They had had no contact with other Eskimo for many centuries, and until discovered by white men believed themselves the only people in the world. They had once possessed both the bow and the kayak, like the other Eskimo, but owing to the peculiar conditions of their habitat they had given them up completely, although the memory of them still survived. Strictly speaking, this is not a wholly satisfactory example, since the disappearance of the traits was due to the special conditions of their habitat, to which they had come from elsewhere. They do not thus represent a strictly stationary group. But the number of peoples in the world who have been isolated and very long stationary is so small and our knowledge of the history of their culture so meagre, that satisfactory examples are almost impossible to find.

The great rarity of instances of isolated and stationary peoples, serves to emphasize the fact that the vast majority of the world's peoples have been neither stationary nor isolated. The consequences of this fact for the history of traits are clear. For where a people have moved from one environment to another, the traits of their culture are subject to the modifications which such changes in environ-

mental conditions are liable to produce. The use of new materials, the rise of new needs, may profoundly affect some traits, so that after long residence in the new habitat these features of the people's culture may come to be greatly changed. An example of the character and extent of change undergone by non-material culture traits as a result of changed environment, is seen in the modification in the religion of the Hindus which took place after they had migrated from Turkestan to India. Previous to their settling in the Punjab they had lived in an arid climate and were largely pastoral. In India they became predominantly agricultural, and thus dependent on the regular occurrence of monsoon rains. As a result, in part, of this change, certain significant modifications took place in their religious beliefs. When they came to India, Varuna was the chief deity and Indra, his rain-giving son, was of minor rank. In time their positions were reversed, Varuna being relegated to second rank as a deity of lakes and pools, while Indra rose to supreme importance.¹

But more important yet is the influence of secondary diffusion, for whether the people are stationary or not, cultural traits originating among other peoples are bound to penetrate to them and influence their culture to a greater or less extent. In the following chapter we shall discuss this phenomenon at more length, but it may be noted here that the results of such diffusion on the traits of a people's culture are twofold—on the one hand, contact with a new trait derived from another people may lead to changes and improvements in a trait long possessed, or it may result in the adoption of the exotic trait in place of the old, which then may either wholly disappear or survive only as a vestige.

We have so far been discussing this whole question of

¹ Whitbeck, R. H., "The influence of geographical environment upon religious beliefs," *Geographical Review*, 1918, pp. 316-324.

diffusion mainly from the theoretical standpoint, and it is time to fortify our conclusions by concrete examples in which the processes of diffusion may be seen at work. But here we are faced with a serious difficulty, in that for few, if any, of the simpler inventions and discoveries of uncivilized peoples have we any historical or traditional data whatever. These discoveries and inventions were made so long ago—discoveries of the chief cultivated plants, inventions like that of the fire-drill, the bow, the plow, the loom, etc.—that no recollections exist of their beginnings, and archæological materials bearing on the question are either absent or too scanty in most cases to come to our aid. Under such circumstances about the only course open to us is to try to throw some light on the problem by an indirect approach. Now one method of such approach which has been found useful is that of a study of the geographic distribution of a trait. The procedure is briefly as follows: All known instances of the trait's occurrence are plotted on a map. The distribution thus shown will then be found to be one of two kinds, either the trait covers a single continuous area of greater or less extent, or is found in two or more widely separated and discontinuous areas. In the first case, where distribution is continuous, it is fair to assume that the trait had an origin somewhere within the region over which it is spread. In the second, where the distribution is discontinuous, the possibility that each area represents a separate independent invention at once arises. The problems presented by this latter type of distribution will be discussed in the chapters devoted to secondary diffusion and culture parallels; for the moment we are concerned only with the type of distribution which is continuous.

If, then, having traced the area over which the trait is found, we next proceed to go into details and note on the map the intensity of its use, the grade of its development, or

the degrees of specialization it displays, it usually appears that the simpler, least specialized forms of the trait have a wider distribution than the more specialized, and appear more commonly toward the margins of the area. The greater intensity of use, or the more specialized forms of the trait, on the other hand, tend to gather in a nucleus somewhere in the interior. If we start at such a nuclear spot and move outward toward the periphery of the whole area, we shall accordingly pass through zones of lesser specialization until we come to the margin, where the trait is in its simplest form.

Now the method assumes that normally the wider the distribution a trait has, the older it is. It is recognized that there are exceptions, in that one trait may spread rapidly and another slowly, but since diffusion takes time for its accomplishment, a widely distributed trait would normally have required a longer time for its diffusion than one of more limited extent. Consequently the marginal forms of the trait in such a distribution as that just outlined will be older than those found at the nucleus, and will represent, therefore, the original form of the trait. When a new specialization or modification arises it will tend, according to this theory, to diffuse from its centre of origin outward in all directions, and at any given moment this newest form of the trait is most recent on the margin of the spreading area and oldest at the point of origin. It is generally assumed that the group in which the trait originated, and who have thus used it longest, are the ones most likely to improve, elaborate, or specialize it. This is quite logical, for we have already seen that a trait once invented did not remain immutable, but became specialized or improved or the base of further invention, and that the longer the time the greater the probability of change.

Once such a specialization or improvement has arisen at

the nucleus it will diffuse outward, its advancing front, however, always lagging behind that of the original form which started on its diffusion first. Successive elaborations thus arise in the nuclear area and spread, as it were, in superimposed layers, like successive lava flows, of which the

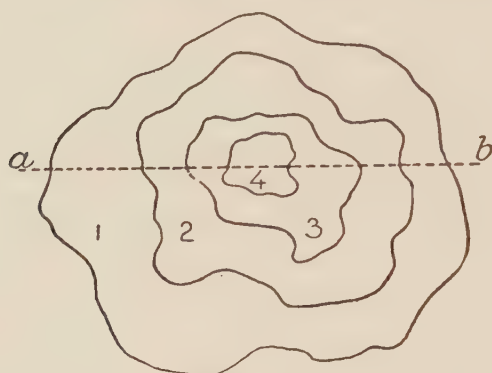


Figure 1.

latest covers the smallest area. Such a theoretical spread of a series of specializations of a trait may be represented diagrammatically as in Figure 1.

In such a case the trait will have passed through four successive stages of elaboration or improvement among a people occupying the central nucleus region, while in its original primitive form it is only just reaching a group along the margin in 1. If we picture the successive diffusions as a series of strata lying one over the other, a vertical cross-section of the above diagram along the line a-b, would take the form of a stepped pyramid like Figure 2.

On this theory and by this method, then, if a trait presents a series of variations or specializations, and is thus not wholly uniform throughout the entire area covered by its distribution, we can analyze these differences, and by plotting them in the manner outlined may determine where

the trait arose, and unravel something of the history of its spread. For, according to the theory, where the nucleus lies, there is the centre of origin of the original trait, and there all subsequent modifications have taken place. This

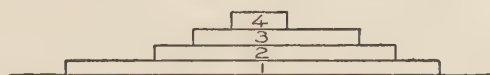


Figure 2.

method of historical induction, based on the geographical distribution of the modifications of a trait, has been used with signal success by various investigators—by Nelson¹ in his studies of the archæology and cultures of the southwest; notably by Kroeber² in his monograph on the tribes of California; and most recently by Wissler³ who has applied it to the larger problem of the whole of the New World, extending it also to cover physical as well as cultural features.

Before offering any criticism of the method and its assumptions, or illustrating its use by concrete examples, it may be pointed out that it is far more easily applicable to what are known as trait-complexes than to single traits. Its greater applicability to trait-complexes is due to the fact that comprising, as they do, often a considerable number of individual traits, the specialization and elaboration required for the method is more easily noted. In a later chapter, when we are dealing with trait-complexes and their diffusion, we shall revert to the matter again.

Before proceeding to a concrete example of the use of the method, I wish first to make one or two general criticisms, both of the method and of some of the assumptions on

¹ Nelson, N. C., "The Archæology of the Southwest: a Preliminary Report," *Proc. Nat. Acad. Sciences*, vol. 5, pp. 114-120.

² Kroeber, A. L., "Handbook of the Indians of California." Bulletin 78, Bureau of American Ethnology, Washington, 1925.

³ Wissler, C., "The Relation of Nature to Man in Aboriginal America." New York, 1926.

which it rests. To begin with, a fundamental postulate of the method is that, in general, the wider the distribution a trait shows the older it is. Use has been made of this assumption not only in connection with this particular method, but by itself, as, for example, where Doctor Kroeber¹ relies on relative width of distribution to determine the cultural traits brought by the first immigrants to the New World. Doctor Kroeber recognizes that there are exceptions to the rule, but believes that "in the absence of specific contrary considerations, heavy weight must be given to wideness of occurrence in rating antiquity."² Doctor Wissler, on the other hand, makes no explicit reference to possible exceptions.³

Now I cannot but believe that the exceptions to the rule, as simply stated, are much more numerous than seems to be believed. If we say, merely, that of two different traits the one having the wider distribution is the older, the number of instances where the exact opposite is true is unquestionably large. Doctor Kroeber cites the wide distribution of Christianity, in contrast to the restricted area held by the much older Persian Fire-Worship, and the rapid spread of the use of tobacco as exceptions, but many others will occur to any one after a few minutes thought. Even if we rule out the immense number of instances due to the world-wide spread of modern civilization and its products—such, for example, as the use of matches in contrast with, let us say, flint and steel—even if these are omitted, the instances where older traits have a more restricted distribution than younger ones is great. Thus, to cite but a few, in the early centuries of the Christian era, the use of iron weapons in the Old World was certainly more extensive than those of

¹ Kroeber, A. L., "American Culture and the Northwest Coast," *American Anthropologist*, vol. 25, pp. 1-21.

² Kroeber, A. L., "Anthropology," New York, 1923, p. 302.

³ Wissler, C., *op. cit.*

bronze, although the latter were, as a trait, far older; by the fifteenth century the use of the alphabet had spread over the greater part of the Old World, while ideographic script was confined to China, although as a trait it had been in use in Egypt and Mesopotamia thousands of years before the alphabet was devised; both Islam and Christianity are more widely spread than Buddhism, yet the latter is much the older faith; the use of money is to-day more extensive than that of barter, although this is obviously the older trait of the two. The fault lies, I believe, in the form of statement of the rule. If we say that of two *different* traits the one having the wider distribution is necessarily or almost invariably the older, we are perhaps almost as likely to be wrong as right; if, on the other hand, we make the same assertion for two different forms or stages of development of the *same* trait, we are likely to be correct almost every time.

So, referring to the examples just given, in the early centuries of the Christian era steel weapons had a much more limited distribution than the older form of plain iron; in the fifteenth century alphabets derived from the later Roman forms were in use over a smaller area than that in which those derived from the older Syriac were found; in Islam, the Sunni comprise the bulk of the Mohammedan world, while the later sect of the Shia are mainly confined to Persia; in Christianity, Roman Catholicism is of wider extent than Unitarianism; in the twelfth century metallic money was widely used, while the newer form of paper money was confined to China. Where we are dealing with two quite different traits, there are a score of factors which may aid the diffusion of the one and retard that of the other, factors which are quite untraceable in the case of peoples without detailed history, and often difficultly traceable for those which have. So we cannot tell in such cases whether or not there are, as Doctor Kroeber says, any "specific considera-

tions" which would argue against the mere facts of distribution. We shall see, in the following chapter, that there is no necessary relation whatever between the extent of diffusion of two different traits, for either one may outstrip the other, whether their diffusion is synchronous in the beginning, or one follows the other after a longer or shorter interval. For these reasons, then, mere breadth of diffusion is, as between two different traits, at best a most treacherous guide to antiquity. The case is quite different, however, for modifications or specializations of the same trait. Here, barring the exceptions to be presently noted, the sequence with which diffusion begins tends to be perpetuated, and the wider the distribution the older, normally, is the form of the trait.

The second point to be noted is that diffusion, although it may under rather exceptional circumstances proceed regularly outward from the centre of origin in all directions, usually is quite irregular. In our earlier consideration of primary diffusion we have already noted some of the reasons why this must be so—such as the variability of individual or group conservatism, the favorable or adverse effects of differences in environment, the competition of already existing traits, the vagaries of fashion, etc. To this we might add the effects of intragroup migrations, by which a tribe or even a family or single individual, moving from the portion of the area in which the trait is already well established to an outlying region which it has not yet reached, may serve to spread the trait in this direction much faster than in others where its advance is due to normal diffusion alone. Although Doctor Kroeber stresses the tendency toward a regular radial diffusion, he explicitly recognizes the possibility of asymmetry which Doctor Wissler tends to disregard. Indeed, by the use of schematic diagrams, drawn in the form of concentric circles, he helps to

fix in the minds of readers a false picture of the actual facts.

A corollary of the normally irregular tendencies in diffusion is that the assumed centre of origin of a trait, the nucleus, need not be and very often is not even approximately central geographically in the area. That it often is roughly central is true, but the examples to be given presently show clearly that a marginal or almost marginal location is by no means unknown. When correctly plotted, some of the examples given by Doctor Wissler as evidence of the central location of the nucleus, are themselves evidence against this view.

In the matter, further, of the trait nucleus being the centre of origin of new specializations, because these are invented only where the trait is historically oldest, Doctor Kroeber makes, I believe, a significant point. He suggests that the nuclear centre or trait hearth is not so much a place where new invention occurs, as one where elements originating in various parts of the area are co-ordinated and synthesized to make a new entity. This would serve to explain in large part why such a hearth is often more or less centrally located. For diffusion from the whole area would normally be more likely to reach the centre than any given point near the margin. So that as a result, a centrally located spot would have a greater wealth of new elements or variations arising within the area to draw upon, than would any other place.

Another, and I believe important, point has to do with the assumption that modifications, elaborations, or specializations of a trait arise only at one point, namely, the centre of origin for the trait itself. This assumption, logical as it seems, must, I believe, be regarded as by no means always correct. It is true that the originating group, having been longest in possession of the trait, is *on this basis* most likely to originate modifications or specializations. But time and

long familiarity with the trait are not the only factors involved, or at least are not so in a large number of cases. For all culture groups which are not completely isolated (and of these there are very few) are open to the influences of adjacent cultures, from whom they may receive by secondary diffusion exotic traits of all sorts. Now an impulse resulting in the modification or specialization of an existing trait may be given by such exotic importations, and as these by normal diffusion reach the margins of a culture area before they penetrate to its interior, the tendency to develop new forms on *this basis* may arise at any point on the periphery, irrespective of the location of the trait nucleus. The example so ably presented by Doctor Kroeber¹ of the growth of religion among the Californian tribes presents an apt illustration of this point. For here the latest specialization in the northwestern portion of the area, the wealth-display ceremony, is undoubtedly the result of exotic stimuli stressing the importance of wealth, which have diffused from the Northwest Coast culture farther north. Similarly, the Chungichnish cult, the latest specialization in the southern portion of the area, equally clearly owes something of its character to influences diffused from the culture of the Southwest.

I believe it to be demonstrable, therefore, that, irrespective of the geographic position of the trait nucleus within the area, specialization and modification of the trait do not arise solely in the nucleus, but may develop quite independently at one or more other points near the margin, where exotic stimuli are at work. Such a marginal nucleus may, under favorable circumstances, come to be the dominant one. An obvious corollary of all this is that there may, therefore, be multiple trait nuclei within an area.

One final criticism and we may proceed to concrete ex-

¹ Kroeber, A. L., "Anthropology," chap. XII.

amples. In discussing the diffusion of a trait from its centre of origin it is sometimes implied that this is a regular process, regular both in space and time, so that distance from the source of origin gives one a relative measure of elapsed time. It is obvious that if there is any truth in what we have claimed as to the irregularity of diffusion, both in space and time, any such attempt to solve time problems by merely measuring off distances on the map is likely to be not only misleading but futile. Even if all available historical data are taken into consideration, and allowance made for known stimuli or impedances, so simple a rule of thumb could lead only to very tentative results. Where there is refusal to make allowances even for known historical movements or other sources of irregularity, I cannot but feel that a basing of historical conclusions on such a mechanical application of the method is fraught with danger.

Let us now, however, come down out of the clouds of criticism, and examine a few concrete instances of trait distribution which will serve to demonstrate the truth of the opinions expressed.

We may take first the case of the outrigger canoe, which illustrates excellently both the advantages and disadvantages of the method, as well as the dangers which a careless or merely mechanical application of it involves. For this reason I shall venture to treat the example in some detail. It is true that the spread of the outrigger canoe cannot strictly be called a case of primary diffusion, since it has extended far beyond the confines of the probable originating group or culture area. Yet the region covered is one which possesses, nevertheless, a certain degree of unity. In view of the difficulty of securing adequate data for cases of strictly primary diffusion, and of the multitude of points which this particular case serves to exemplify, I have ventured to include it here. We shall consider the distribution

of two separate traits—(1) the double and single outrigger, and (2) the methods of attachment of the outrigger to the booms. As is well known, the outrigger canoe is a canoe which is kept from tipping over by floats or outriggers attached to two or more booms which extend horizontally outward from the sides of the vessel. As a type of canoe it is widely used over an area extending from the East African coast to the extreme eastern limits of Polynesia, and from the Philippines and Hawaii in the north, southward to New Zealand and Australia.¹

The outrigger canoe differs in type according to whether the stability of the canoe is assured by a float or outrigger on one or both sides. In Figure 3 the distribution of these two contrasted forms is shown. It will be seen that the double outrigger occurs in three main, continuous areas more or less widely separated, which are (1) Madagascar, the Comorro Islands, and the East Coast of Africa from Dar-es-Salaam to Lamu; (2) the whole of Indonesia (ex-

¹ The main sources of information on the points here treated are to be found in the following:

Best, E., "Did Polynesian Navigators Know the Double Outrigger?" *Journal Polynesian Society*, vol. 32, pp. 200-214.

Crossland, C., "Notes on the East African Outrigger Canoe," *Man*, vol. 18, no. 90.

Friederici, G., "Beiträge zur Völker- und Sprachenkunde von Deutsch-Neuguinea." *Mitt. a. d. Deutsch. Schutzgebieten*. Ergänzungsheft nr. 5. Berlin, 1912.

Haddon, A. C., "The Outrigger Canoes of Torres Straits and North Queensland." In:—*Essays and Studies Presented to William Ridgeway*. Cambridge, 1913, pp. 609-634.

"The Outrigger Canoe of East Africa," *Man*, vol. 18, no. 29.

"An Anomalous Form of Outrigger Attachment in Torres Straits and Its Distribution," *Man*, vol. 18, no. 68.

"The Outriggers of Indonesian Canoes," *Journal of the Royal Anthropological Institute of Great Britain and Ireland*, vol. 50, pp. 69-135.

Hornell, J., "The Affinities of East African Outrigger Canoes," *Man*, vol. 19, no. 55.

"The Common Origin of the Outrigger Canoes of Madagascar and East Africa," *Man*, vol. 20, no. 67.

"Les Pirogues a Balancier de Madagascar et de l'Afrique Orientale," *La Géographie*, vol. 34, pp. 1-23.

Lydekker, C. J. W., "The 'Mtepe' Dhau of the Bajun Islands (E. Africa)," *Man*, vol. 19, no. 46.

Müller-Wismar, W., "Austroinsulare Kanus als Kult- und Kriegs-symbole." *Baessler Archiv*, II, pp. 235-249.

cepting Nias and the Mentawai Islands, off the Sumatran coast) together with the western end and whole northern coast of New Guinea as far as Cap d'Urville; and (3) the region about the delta of the Fly River in southern New Guinea, the Torres Straits Islands, and the northern and



Figure 3.

Distribution of single and double outrigger.

northeastern shores of the Cape York Peninsula, Queensland. It is, or was, also found in three other small, isolated, and widely scattered regions, namely, (4) Easter Island and the Marquesas group; (5) New Zealand; and (6) the Pelew Islands, Ponapé in the Carolines, Samoa, and Nis-san. In the second area the double outrigger is practically the only type in use, except at the eastern end of its distribution along the northern coast of New Guinea, where, from Geelvink Bay eastward, the single type is also found. In the first, third, and fourth areas the double outrigger coexists or coexisted with the single; in the fifth it had gone out of use in historic times and was known only by tradition; and in the sixth it occurs as a doubtful local usage in regions where otherwise only the single form is in use.

The single outrigger, on the other hand, is found in two continuous but widely separated regions: (1) southern India and Ceylon, together with the Maldivé, Andaman, and Nicobar Islands and Nias and Mentawai off the Sumatran

coast; and (2) the whole of present day Polynesia, Melanesia, and Micronesia except for the few isolated spots where the double form occurs. In addition, there are a few isolated and outlying points where the single form is known, *i. e.*, in Madagascar and the Comorro Islands and a few scattered spots in Indonesia.

Now it will be noted (1) that the double outrigger has the widest distribution and (2) occupies both a central and marginal position. Its wide extension, its marginal position, and the scattered form of its distribution all combine to suggest that as a cultural trait the double outrigger is older and more primitive than the single form. Yet the roughly central position of the great Indonesian area in which the double form is almost exclusively used, would, on the theory that the nucleus is centrally located and possesses the historically latest form, mark it as the younger of the two. Indeed, Doctor Wissler does come to this conclusion,¹ but does so with justification only in that he has considered primarily the Indonesian portion of the area over which the traits are diffused. But such an arbitrary limitation to a single portion of the whole area is obviously misleading, and conclusions based on a partial investigation of the facts are not likely to be valid.

At first sight, then, the evidence for the whole area of distribution, showing the double outrigger to be both central and marginal, appears to be contradictory. It ceases to be so, however, if we examine the situation a little more closely. It will be noticed, in the first place, that whereas the central area, in which the double form is found, contains several inclusions of the use of the single form, and the East African region one such; on the other hand the

¹ In opposition to Haddon, whose data he uses. See Haddon, A. C., "The Outriggers of Indonesian Canoes," *Journal of the Royal Anthropological Institute of Great Britain and Ireland*, vol. 50, pp. 69-134.

eastern and largest area in which the single form is dominant has around its margin inclusions of the double form. We have thus a pretty problem. Taking first the eastern area of the single outrigger, with its inclusions of the double form, these might theoretically be interpreted either as isolated survivals of an older form now confined to the margins, or as centres in which a new modification had begun. Their marginal position, however, speaks in general against this latter explanation, as does also the fact of their considerable number, for it would be most unlikely that the same modification should arise independently at so many widely separated spots. On the facts of distribution alone, then, one would be led to believe that the evidence given by this eastern region tallied with that derived from the consideration of the area as a whole, *i. e.*, that the double outrigger is the older form.

If we turn now to the western area we find the situation exactly reversed, for here we have an inclusion of the single type in an area where the double form prevails. Yet here, again, the double form is marginal, and the inclusion, instead of being multiple and scattered, is here a single, roughly central spot, so that its interpretation as a new invention does not involve the difficulties that the reverse would in the case of the eastern region. Here, then, in the west as previously in the east, the data of distribution seem to substantiate the general conclusion that the double form is the older type. How now shall we explain the puzzling situation in Indonesia, in that in the area which is central for the whole region what seems to be the oldest type prevails? Briefly, the situation on closer examination is this. In the long, thin eastern extension of this central area along the northern coast of New Guinea we have both the single and the double forms present, sometimes together, sometimes the single form only being present, and this latter is

clearly dominant throughout. In the main Indonesian region the single form occurs "sometimes" in Sumatra, is known certainly from the Mentawai Islands off the latter's western coast, in a transitional form at Madura on the north coast of Java, in the Sangir Islands north of Celebes, and in toy boats from northwestern Borneo. Now the co-existence of the two types in northern New Guinea seems probably due to a diffusion westward of the single type exclusively in use in all the rest of Melanesia, this northern New Guinea section being thus a true transitional zone between the two types. It is not likely to represent an eastward diffusion of the double type, for, as will be seen presently, all historical evidence shows that this is giving way before the single type. The same may also probably be said in regard to the Sumatran cases, since in Nias and the adjacent islands and the Indian coast farther west, only the single form occurs. This leaves us with three isolated spots, Madura, northwestern Borneo, and the Sangir Islands. In the first and last of these we have a peculiar form of the single outrigger in which the booms project out on the opposite side of the canoe, as if they were to be attached to a second outrigger on that side. They are, however, cut off too short for this, and form what is technically known as an "outlayer," having crosspieces laid on them to form a sort of platform on which goods may be placed or passengers may sit, to serve as a counterbalance for the single outrigger float on the opposite side. It may, in fact, be regarded as an actual mode of transition from the double to the single outrigger, and as such is more fully developed in Micronesia.

Very significant in this connection is the fact that in Madagascar, where the double outrigger has given place to the single within the last two centuries, transitional forms directly comparable are known, with a further stage in

which the "outlayer" is reduced to almost nothing. Since, then, we know that identical transitional forms occur where the change from double to single outriggers is going on, it seems extremely probable that we have in Indonesia, at Madura and in the Sangir Islands, another example of the same sort. The close proximity of the latter to the Pelew group at the western extremity of Micronesia, where the "outlayer" is more fully developed and no double outriggers are known, seems in this connection to be significant. For we might then suppose that the second outrigger, having been found to be unnecessary and replaced by the "outlayer," this in its turn after trial was found of no great value, and in its turn discarded, leaving only the single outrigger, which prevails from eastern Micronesia on through Polynesia. The Bornean case stands thus by itself. It is not an actual canoe, only a toy, and may, therefore, have no great meaning; yet archaic forms are often preserved as toys. With this single exception, then, the evidence for the Indonesian region would seem to parallel that from the western area, in that the single type, where it exists apart from probable diffusion, is apparently relative to the double form, a modern invention.

That this conclusion, thus reinforced, is correct, is confirmed by the historical data, which show that in New Zealand and the Pelew group the double outrigger had been replaced by the single within traditional times, and by the fact that in the Marquesas and Easter Islands the double type was rare when the islands were discovered, and has gone out of use in historical times. The same evidence is forthcoming also for other areas as well. In Madagascar, whereas in the sixteenth and seventeenth centuries only the double form was known, by the middle of the nineteenth both were in use, and to-day the double has entirely disappeared, only the single form being known. On the East

African coast the older double form still remains the only one in use. In the Fly River delta, in southern New Guinea, the use of the single outrigger has encroached noticeably within the last generation.

For India the evidence is somewhat less clear. Here there is presumptive evidence only, for the outrigger vessels in use on the west coast about the eighth century, which are depicted on the bas-reliefs at Borobodur in Java, are believed by Haddon¹ to have had two outriggers, although the evidence is far from conclusive. It is based solely on the fact that on the five ships shown (all are shown from one side only) four are figured with the outrigger on the port and one is shown with it on the starboard side. It is argued that therefore there must have been two outriggers, one of which could not be brought into the picture. If single outriggers were always placed on one particular side of the vessel the argument would have force, but as not infrequently they are placed sometimes on one, sometimes on the other side, it cannot be regarded as conclusive. If, however, Haddon's conclusion is accepted, then we have a replacement of the double by the single form some time after the eighth century and before about the sixteenth, when the single forms now in use were first reported.

Further evidence of the antiquity of the double form in Indonesia itself is afforded by the fact that the Madagascar and East African forms of outrigger canoe can be shown to have been derived from the type in use in northern Java. As from linguistic evidence we know that the Malay migration which brought this canoe type to Madagascar and thence to the continent took place before Indian influence had become strong in Java, it follows that as far back at least as the beginning of the Christian era the double form was the characteristic one, at any rate in western Indonesia.

¹ Haddon, *loc. cit.*, pp. 101 *seq.*

All the evidence together, then, distribution as well as historical data, appear to lead to the same conclusion. Despite the occurrence of a roughly central area showing only the double outrigger, this is not the younger but the older form, and despite the fact that this Indonesian region is generally accepted as that in which the outrigger canoe was first invented, and should, therefore, according to theory, be the centre from which all new modifications spread, the younger, single outrigger type is there virtually unknown.

Yet this conclusion, logical as it seems, meets with a rather serious difficulty. The early Dutch voyagers to the East Indies have left us drawings and descriptions of the native craft in use there at the end of the sixteenth and during the early seventeenth and eighteenth centuries. If we turn to these¹ we find that only the cora-cora or large war canoe is actually shown with double outriggers, the smaller craft almost without exception, and in some cases the cora-cora itself, being drawn with only one. Haddon² notes this fact, but states that "as nearly all the boats are drawn in side-view, only one outrigger could be depicted" and so concludes that "we are probably justified in assuming that the outrigger was double in all the Moluccan craft." I fear that I cannot wholly agree with this, for if one examines the illustrations, it appears that in several instances³ the vessels are shown bow or stern on, or at such an angle that a

¹ (Lodewijksz, W.), "Le Premiere Livre de l'histoire de la navigation aux Indes Orientales par les Hollandais," etc., etc. Amsterdam, 1609.

(Roelofsz, R.), "Le Second Livre, Journal ou Comptoir, contenant le vray Discours et Narration historique du Voiage faict par les huit Navires," etc., etc. Amsterdam, 1609.

Bry, J. T. de, "India Orientalis" (Tertia, Quinta, Octava Pars). Francofurti, 1601-5.

Noort, O., "Description du penible Voyage faict en tour de l'Universe . . . par Sieur Olivier du Nort d'Utrecht." Amsterdam, 1602.

Schultzen, W., "Ost-Indische Reise." Amsterdam, 1676.

Valentijn, F., "Oud en Nieuw Oost-Indien," vol. IV, Amsterdam, 1726.

² The "Outriggers of Indonesian Canoes," p. 78.

³ Roelofsz, Plate XIV; Valentijn, Plates XXXI, XLIII; De Bry, Quinta Pars, Plates XII, XIII.

double outrigger, if present, would almost certainly have been shown. For in one case¹ a large cora-cora is drawn in side-view, yet the outrigger on the opposite side appears. In the descriptions, however, of the large boats as given in the texts, two outriggers are definitely spoken of. Furthermore, this use of a single outrigger on the smaller boats of the end of the sixteenth century is indicated not only for the Moluccan region, but also for Java² and Borneo.³ It seems, therefore, that there is some reason to believe that in the sixteenth century the single outrigger was possibly the prevailing form except in the case of the large war canoes, and that the double outrigger has become general and displaced the single form since that time. The Portuguese and Spanish writers of the early sixteenth century⁴ might be expected to throw light on the problem, but so far as I have examined them, they supply no pertinent data whatever.

The acceptance of this view, however, lands us in a new series of difficulties. For if the single outrigger was the older and original type in Indonesia, how comes it that the double form was found in universal use in Madagascar and East Africa in the seventeenth century, giving place later to the single form? If it were the latter which had been brought by the Indonesian immigrants, this would imply a double reversal; and the same would hold true for Polynesia. We cannot account for the double type in Madagascar and Polynesia as due to a later Indonesian emigration, for the change to the double form there could not have occurred until the middle of the seventeenth century, and we know that no such movements took place, either eastward or westward after that time. Further, in New Zealand the double form seems to have been already present in the thirteenth

¹ Roelofsz, Plate IX.

² Lodewijcksz, p. 35.

³ Noort, p. 48.

⁴ Barros, Couto, Castanheda, the letters of Xavier, etc., etc.

century, some four hundred years prior to the period when, on the basis of the Dutch drawings, the single form was still dominant in Indonesia. The whole problem is obviously much confused, and no certain conclusion either way seems possible at this time.

We are confronted now, however, by a further deviation from the simple scheme, namely, that what has been shown to be probably the younger form, *i. e.*, the single outrigger, occurs in two areas separated by a region in which, so far as certain evidence goes, the double form is and apparently always has been dominant. It is evident that the situation can be explained only in one of two ways—either the single outrigger was invented in one of these two areas and transmitted to the other, or it was invented independently in each. If we assume the first alternative and suppose that the invention of the single form took place in India, then it would have had to be at some time subsequent to the eighth century, if Haddon's surmise as to the earlier prevalence of the double form is correct. It is true, one might suppose it to have been invented much earlier, and that the double forms of the eighth century were merely a vanishing survival. But even so, it was clearly the supposed double form that was used for long-distance sailing, as shown by its use in the Java trade. Yet there is no evidence of any Indian trade or connection of any sort with the region east of Indonesia, either after the eighth century or before. Furthermore, since everywhere without exception, where the single type comes in contact with the double, the latter has given way in its favor, it would be hard to believe that the peoples of Indonesia, or at least some of them, would not have taken up the single form and adopted it, if it were being brought to them from India; for it is inconceivable that Indian contacts with the region east of Indonesia could have taken place without contacts in Indonesia. If, finally, we should,

for the sake of argument merely, assume with some students an ultimate Indian origin for the Polynesian peoples, the difficulty becomes all the greater, since at this early period presumably only the double form was in use. We seem thus debarred from explaining the occurrence of the single outrigger in the eastern area as due to a diffusion from the west. Theoretically, a reverse movement would be possible, but there is no evidence, that I am aware of, which points toward a westward diffusion of cultural traits in this region, nor of any movement of peoples from Polynesia or Melanesia westward to India. There is left, thus, only the other alternative, *i. e.*, the independent invention of the single outrigger in each area. We have already seen that each area shows the transitional stages between the double and single form, and that in the western the independent development of the single outrigger is an established historical fact. It would seem that further proof were hardly necessary. Until, then, evidence is presented demonstrating the contrary I can see no escape from the conclusions to which both the actual facts of distribution and all the historical data point.

This long, and I fear tedious, discussion of the single and double outrigger has, I hope, shown the value as well as the difficulties of the method of geographic distribution, if it be carried out with due regard to *all* the facts and with the assistance of such historical data and deductions as are available. At the risk of further wearying the reader I cannot refrain from giving some space to a consideration of the second feature of the outrigger canoe, that of the methods used in attaching the float to the booms, for it adds further illustration of the conclusions arrived at on theoretical and general grounds. Although in some ways even more significant than the discussion just completed, it is more complex, and for its complete elucidation involves a large amount of

technical detail. I shall, however, present the problem only in outline and stripped so far as possible of tiresome particulars.

There are two fundamentally different ways in which the booms may be connected with the float or floats, *i. e.*, by

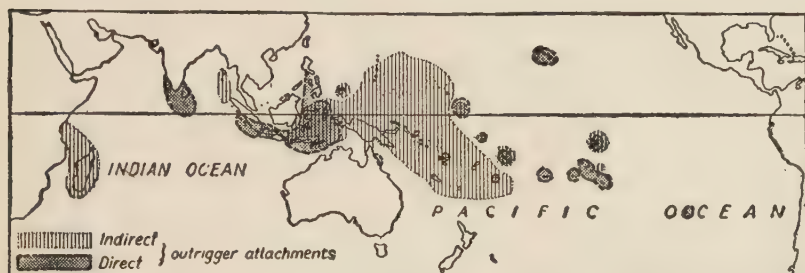


Figure 4.

Distribution of direct and indirect outrigger attachments.

direct or by indirect attachment. In the former the ends of the booms are fastened directly to or inserted in the float; in the latter they are attached by means of a separate connecting-piece. Can we discover by their distribution which of these two methods is the older and more primitive? In Figure 4 the distribution of the two types is given, and it is clear that, generally speaking, the central portion of the whole area, *i. e.*, Indonesia, shows both forms present; that toward the west the indirect type is marginal to the direct; whereas to the east the exact opposite holds true. The only exceptions in the latter case are the Marquesas group and the single island of Reao, in the Paumotus.¹

The evidences for priority on the basis of marginal distribution are thus, at first sight, conflicting. Let us look closer. To the west from the central area we notice that there is quite a large region in western Indonesia in which

¹ So far as I know the evidence for Reao has not been published. It rests on a model from this island in the Peabody Museum, Harvard University.

the direct attachment is dominant except for a single spot in northern Java, and that then there follows an alternation of the two forms, ending with the small area of Madagascar and the East African coast in which the indirect form alone occurs. To the eastward is a large region, comprising all of Melanesia and Micronesia, where the indirect form occurs, followed by an area in which both forms are found closely mingled, giving place finally to one including all of central and eastern Polynesia, where, with the two exceptions noted, the direct form occurs. The two marginal types are not by any means equal, the eastern direct type covering a very much larger area than the western indirect, and appearing as the main marginal form north and south. It is clear, however, that the evidence from distribution is altogether too contradictory to be conclusive, yet so far as there is a preponderance of evidence, it would seem to favor slightly the direct as the older form. Such historical data as we possess, however, only add to the confusion, for we know that the indirect form of Madagascar and East Africa was brought by immigrants from Indonesia, where in the eighth century, at least in Java, the direct attachment seems to have prevailed, as shown by the bas-reliefs of Borobodur. The Malayan immigrants to Madagascar could not, on linguistic evidence, have left Indonesia (probably Java) as late as the eighth century, and if they left earlier and brought with them the indirect attachment, then the direct form followed this in Java and is the younger type!

How far can the *impasse* be cleared by taking into account known movements of population within the area? Reference has just been made to the drift of Indonesian peoples westward to Madagascar. If we make allowance for this, and consider the situation as it would have been prior to their leaving Indonesia, then the Indian area be-

comes the western marginal one and shows the direct form. A series of eastward drifts from Indonesia also occurred, responsible for bringing thither the ancestors of a large part of the present Polynesians. If we attempt to make similar allowance for this eastward movement, then Melanesia, with its exclusively indirect type, becomes the marginal region. All that we have accomplished by eliminating known migrations is to reverse the present marginal distributions! But although we have jumped out of the frying-pan into the fire we can glean at least this bit of information: since the westerly drift was characterized by possessing one type of attachment and the easterly the other, *both* types must have been in use in Indonesia at the period when the migrants left. But, the direct type carried by the eastward-moving group is that now characteristic of western Indonesia in the main, whereas the indirect type carried by the westward-moving group is primarily an eastern Indonesian form! Either the two currents must have crossed or there has been a reversal of type in the Indonesian area since the departure of the two groups.

But another puzzle also arises in that the Polynesian ancestors, as users of the direct type, must have passed through the whole of Melanesia or Micronesia, or both, without influencing the peoples of those areas at all. This difficulty does not arise in the case of the westward emigrants, for they went directly from Indonesia to Madagascar so far as we know. It is difficult to believe that the Polynesian ancestors could have brought the direct type of attachment all the way through Melanesia or Micronesia without leaving traces behind, unless we assume that this type is markedly inferior to the indirect. If it were, then we can understand why peoples possessing a better form should not have taken it up. Now this assumption of clear

superiority for the indirect type is made by Haddon,¹ but it may at least be argued to the contrary that the Polynesians and not the Melanesians were the better sailors, the most skilful navigators, and the ones making by far the longest and most difficult voyages. If there was such evident superiority in the case of the indirect type, then it would be surprising if such keen sailors should not have appreciated it, and themselves adopted it on their way through its Melanesian or Micronesian territory. If we attribute such failure to conservatism, this would seem to be rendered doubtful by the known readiness with which the Marquesans discarded their former type of attachment and adopted the Madagascar form, introduced by a mulatto some years ago.²

If we find it hard to believe that the direct type of attachment was brought with them by the Polynesian ancestors, we seem to have no choice but to suppose that they came with the indirect, and either invented the direct form after reaching Polynesia, as an improvement, or that its use represents a degeneration and reversion to an older, more archaic form. If we take the first alternative, we must suppose that the direct form could not have been in use in Indonesia when the migrants left, so that it must therefore have been independently invented there later, just as by the Polynesians in the region farther east. The second alternative is not promising, for, so far as everything connected with navigation is concerned, the Polynesians show no trace whatever of any degeneration, since they are generally recognized as the most expert and able seamen in the whole Pacific region.

Is it possible, then, that the first alternative can be right? It means, of course, that the indirect type is the more primi-

¹ Haddon, A. C., "The Outriggers of Indonesian Canoes," *J. Roy. Anth. Inst. G. Brit. and Ire.*, vol. 50, p. 99.

² Linton, R., "The Material Culture of the Marquesas Islands." *Memoirs, Bernice Pauahi Bishop Museum*, vol. 8, no. 5, pp. 298-299.

tive and older, and that the direct is the younger form. If, for the moment, we grant it, then everything seems to clear up. With the indirect the older type, the westward migrants could have carried it with them to Madagascar, and kept it unchanged. In India and the western portions of Indonesia with which India had early contacts, the improvement to the direct form took place. The eastward migrants then carried the same original indirect form with them to Polynesia, where, quite independently of the Indian invention of the direct form, it was independently attained. In the central region of Indonesia, however, the older indirect type remained, with some penetration of the younger direct type from the west, it is true, but virtually repeating the conservatism which we have already seen it showed in the matter of the double and single outrigger. To accept this conclusion is to go in the face of what seems the logical sequence, for the direct would seem to be the more simple and primitive type. It also goes contrary to the careful opinions of Haddon and Friederici. Yet the contrary view lands us, as we have seen, in a sea of troubles and contradictions. One thing, however, the investigation does establish—that the mechanical application of the method of geographic distribution does not always lead us by simple paths to a certain conclusion!

Let us pluck up courage and turn for just a moment to two or three other small points, where the results of our inquiry will not be so disheartening! First, let us consider the direct form of attachment a little closer. It is found to occur in two forms, one in which the end of the boom is inserted into a hole made in the float, and the other where the end is merely lashed to the outrigger. Reference to Figure 5 will show at once a welcome degree of simplicity. It shows the lashed form to be by far the widest spread, for the inserted form occurs, apart from a large area in Poly-

nesia and one semi-Polynesian island in the New Hebrides, only in two small isolated spots in Indonesia. The Sumatran case is distinctly uncertain, the Bornean instance is that again of the toy boat. Essentially, therefore, we have but one area for the inserted form, and no certain evidence



Figure 5.

Distribution of direct-lashed and direct-inserted outrigger attachments.

of its existence in Indonesia at all. But one conclusion here seems probable—that this is a modification which was developed in Polynesia, and thus forms an example of a marginal nucleus of trait invention.

If we turn now to the indirect attachment, it appears that this presents a large number of different varieties, at least ten being clearly distinguishable, some with several sub-varieties. I wish to speak very briefly of three pairs of these, the members of which may be genetically related, and whose distribution brings out some points of significance. The first may be called the stick-Halmahera type. The stick type is one where the float is secured to the boom by means of one or more straight sticks, lashed at their upper end to the end of the boom and at the lower either inserted into the float like a peg or lashed to it. The Halmaheran type is one in which the sticks, instead of being straight, are bent, forked, or curved, and are usually attached to the ends of the booms by a more complicated system of lashing. Figure

6 shows several forms of each of these types. A genetic relation between the two is possible, since practically all in-

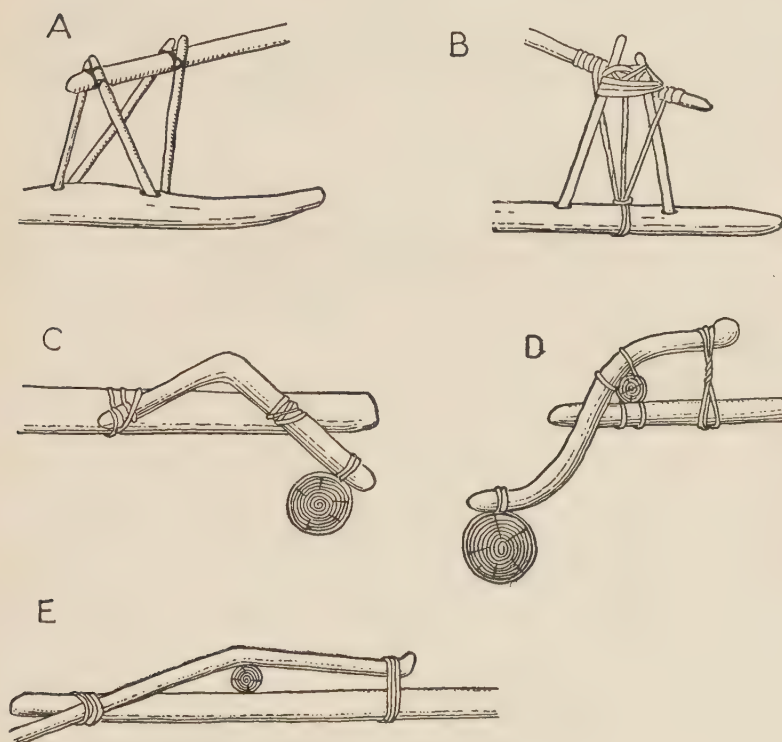


Figure 6.

Stick (A, B) and Halmaheran (C, D, E) attachments.

(After Haddon.)

intermediate stages between the plain, straight stick and the most elaborate Halmaheran form can be found.

In Figure 7 the distribution of the stick and Halmaheran types is shown. It will be seen that the latter occurs in two areas, a main one covering most of eastern Indonesia and a single outlying and isolated case at Mombassa, on the East African coast. The stick type, on the other hand, is clearly marginal. We may infer from this distribution that the

stick form is probably the older, and has been replaced in Indonesia by the Halmaheran, through the intermediate stage of the use of a forked stick, as Haddon suggests, the use of which is found, moreover, along the border between the two types. The isolated case of the Halmaheran type at



Figure 7.

Distribution of stick and Halmaheran attachments.

Mombassa is significant, since it is patently quite unconnected with the Indonesian region and seems thus to be an instance of independent development. There is here a complete series of transitional stages, starting in Madagascar, where the boom is inserted in the stick or peg (here a flat board), through the form in use at Zanzibar, where boom and stick are merely lashed, to that at Mombassa, where the typical Halmaheran form with complex lashing occurs. The only difference to be noted is that the stick remains inserted in the float instead of being lashed to it, as in Indonesia. Here, then, is a capital example of parallel specialization or independent invention, coincidentally central and marginal, separated by a distance of some four thousand miles. It is an instance of what is commonly known as convergent evolution, the two end forms being analogous but not homologous.

A second pair of attachments is that which may be dubbed the undercrossed and Y-stick. The former com-

prises various forms where straight sticks in pairs are crossed, the end of the boom resting in the fork of the crossing. The latter makes use of a natural Y-shaped forked stick, the boom ends resting in the crotch. Figure 8

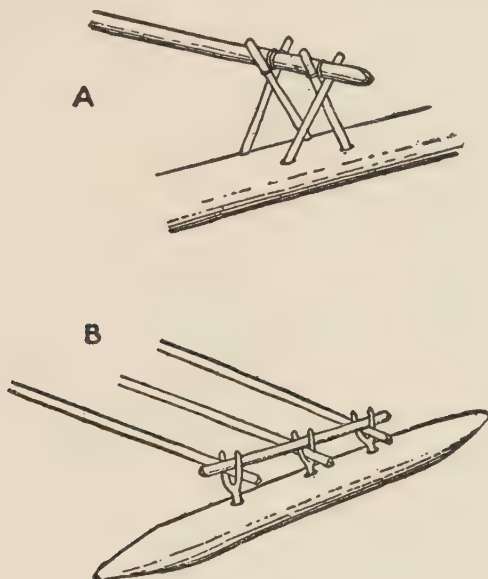


Figure 8.
Undercrossed (A) and Y-stick (B) attachments.
(Latter after Haddon.)

shows the characteristic forms of each type, and Figure 9 gives their distributions. We observe that while not very regular, the Y-stick is, on the whole, central, with the undercrossed form marginal to the north, west, and south, so that we may be justified in regarding this latter as the older and more primitive form. If we are to consider the Indonesian region as the centre of origin of the Y-stick type, then diffusion here has been extremely asymmetrical, since this form has spread only toward the east.

The last pair is the Y-stick and Moluccan. The former

has already been described, but in this case, instead of the boom resting in the crotch, the ends of the booms are lashed to the branches of the Y, which are parallel to instead of at right angles to the boom. The Moluccan form,



Figure 9.

Distribution of undercrossed and Y-stick attachments.

on the other hand, makes use for this purpose of a U, O or 6 shaped piece of rattan. Figure 10 will illustrate these two forms and Figure 11 gives their distribution. It will be noted that the Moluccan type is found mainly in eastern Indonesia, with scattered extension eastward as far as Tonga; whereas the Y-stick form is more marginal, occurring in southern Micronesia and New Caledonia. In the eastward extension of the Moluccan form a definite modification has taken place, in that instead of a single U-shaped piece two are employed (Figure 10-F), the same doubling occurring also with the Y-stick in New Caledonia. Distribution here would lead us to believe that the Y-stick was the older and simpler form. This type of attachment again shows a very asymmetrical diffusion, in that the Moluccan type spread only eastward, and in so doing suffered a significant modification.

Lastly, one may refer to the so-called Balinese type, illustrated in Figure 12. Here a straight or curved piece of wood is either attached to or inserted in the float and then

lashed to the end of the boom. The distribution is peculiar in that it occurs very locally in three widely separated spots,

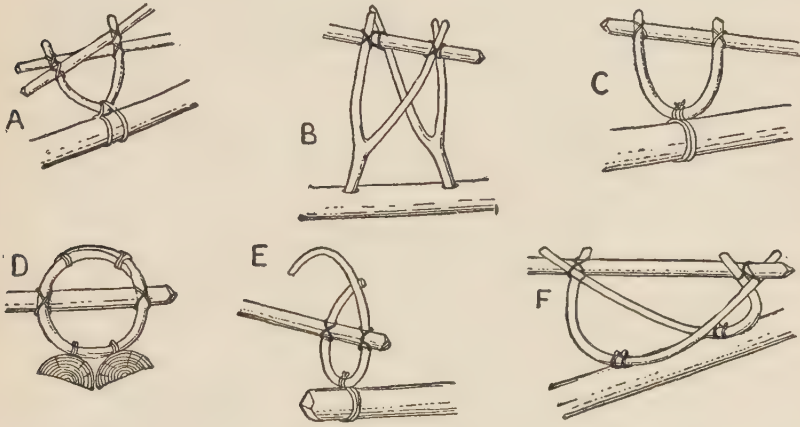


Figure 10.

Y-stick (A, B) and Moluccan (C, D, E, F) attachments.

(After Haddon.)

i. e., Bali and Lombok in Indonesia, the Gilbert group (where it is exceptional, not normal) and Funafuti, and in the single island of Reao in the Paumotu group, in extreme



Figure 11.

Distribution of Y-stick and Moluccan attachments.

eastern Polynesia. It seems probable that, as Haddon suggests, this form is genetically related to the direct-lashed

form. With the possible exception of the Reao case, this Balinese form occurs always in an area in which the direct-

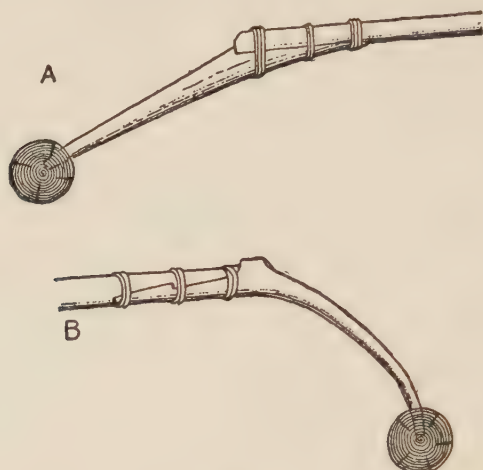


Figure 12.

Balinese attachment. A, Bali; B, Gilbert Islands.

(A after Haddon, B after Grimble, *J. R. A. I.*, vol. 54, p. 123.)

lashed type is also known. From its widely separated, isolated distribution, we seem to have here an instance in

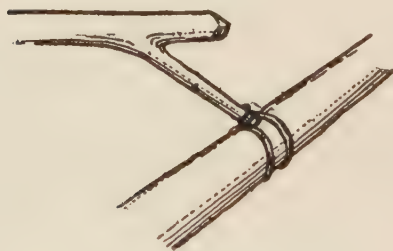


Figure 13.

Outrigger attachment used in Ellice Islands.

(From model in Peabody Museum, Harvard University.)

(Note: The boom consists of a forked stick, one branch of which is lashed to the outrigger float, the other being cut off a little beyond the forks.)

which, at three different points, a very obvious modification of the direct-lashed type was independently made. It is perhaps significant that in the Ellice group, which was in rather close relations with the Gilbert Islands, a type of direct-lashed attachment with a forked boom, was in use. This is shown in Figure 13.

Having considered a number of the methods of attachment and their respective distributions, we may lastly see what conclusions may be drawn as to the relation of the Halmaheran and Moluccan types, a problem taken up by Doctor Wissler¹ with a view to demonstrate the concentric



Figure 14.

Distribution of direct-lashed, Halmaheran, and Moluccan outrigger canoe attachments in Indonesia.

(After Wissler, with corrections.)

1. Moluccan. 2. Halmaheran. 3. Direct-lashed. 4. Limit of single outriggers.
5. Papuo-Australian area of double outriggers.

zoning of traits in diffusion and the possibility of drawing historical inferences therefrom. Confining his attention only to the Indonesian portion of the whole area, and selecting three forms of outrigger attachment from among the many available—the direct-lashed, the Halmaheran, and the Moluccan—he reproduces the essential features of Haddon's map,² and, on this basis alone, concludes that the di-

¹ *Op. cit.*, p. 27 seq.

² Haddon, *loc. cit.*, p. 71. Unfortunately several errors were made by Wissler in copying, and the symbols indicative of the Halmaheran and Moluccan types were inadvertently transposed, so that his map is very misleading. These errors have been corrected in the copy of Wissler's map given above.

rect-lashed is the oldest form, followed by the Halmaheran and the Moluccan. In Figure 14 Haddon's map, as simplified by Wissler, is reproduced, and from its inspection it will be apparent that the three types are arranged more or less concentrically, although not symmetrically. So far as the Indonesian distribution is concerned this conclusion



Figure 15.

Distribution of direct-lashed, Halmaheran, and Moluccan attachments.

seems amply justified. If, however, we bring the whole area into consideration rather than an arbitrarily selected portion of it, we find the distribution as shown in Figure 15. On comparing the two maps we find that the range of the direct-lashed is enormously increased, the Halmaheran turning up far to the west on the East African coast, and the Moluccan extending eastward as far as Tonga. Now this eastern extension of the assumed most recent type, raises certain awkward questions. A diffusion of some three thousand miles must certainly have required a considerable period of time, although if, with Friederici, we attribute it to direct migration, the time would not need to be so long. Now at the Indonesian end of this diffusion we have certain data which seem to supply us with an historical perspective. The older writers who have described this region, or have left drawings of the people and their modes of life—Lodewijksz, Roelofsz, De Bry, Valentijn, etc.—

give us information as to the character of the vessels in use here in the seventeenth and early eighteenth centuries. They give no indication at all, that at that time either the Halmaheran or Moluccan types were in use. They consistently show or describe, on the other hand, a Y-stick or Y-board form. Now it is of course true that the details of illustrations in the older writers are sometimes unreliable, since they were often drawn from rough sketches or descriptions by persons in Europe who had never seen the objects or people. Yet here various illustrations, drawn by different artists over a period of more than a century, agree on this feature, and for De Bry, at least, his general accuracy has been checked up in the American area. Further, the differences between the Y-stick and the Halmaheran or Moluccan types of attachment are so wide, that it seems doubtful if they could have been consistently confused.

If, then, neither of these latter types was actually in use in the heart of the area where they are now found, until after the first quarter of the eighteenth century, the invention and spread of both Halmaheran and Moluccan types must have been accomplished in a period of a hundred years or less, for the Moluccan is described in 1774 and the Halmaheran in 1834. Apart from the fact that the supposedly younger type was thus seen and described some sixty years before the older, it is difficult to believe that the rise and spread of two inventions could have taken place in so short a time. When, then, we add the three thousand miles over which the supposedly latest form diffused to the eastward, the assumption becomes absurd, for from the Melanesian and Polynesian end we know that no such migration as would have carried the Moluccan form to the east, occurred during the eighteenth century or for several centuries before then, at the least.

We seem forced, then, to the conclusion that the seven-

teenth-century writers and artists described and drew only one of the types at that time existing, and for a century or more consistently neglected all others. But this is not by any means true, for several of the artists of this period show small craft with single or double outriggers, apparently using direct attachment of some sort. The "cora-cora" or large war-vessel naturally attracted the chief attention, and it was on this that the Y-stick attachment was shown. We may now return to the question of the long eastward diffusion of the Moluccan type. As has been said, so distant a spread must have required a considerable time for its fulfilment. If so, it is curious to say the least, that during this long period while the trait was travelling toward the east, it did not succeed in traversing the few score miles to the Celebes in the west, the islands off the western end of New Guinea to the east, or the Sunda Islands in the south. It would, I believe, be assuming too great a uniformity of conservatism on the part of peoples as different as those of these surrounding islands, to suppose that they should all have wholly refused to adopt the new invention.

I would suggest, therefore, that a possible way out of the difficulty would be to reverse the conclusion reached by Doctor Wissler, and regard the Moluccan as the older, the Halmaheran as the younger form, which was and is replacing the Moluccan, having spread throughout its whole territory. For it must be remembered that the two forms co-exist throughout, with two possible exceptions,¹ so that we do not have at all the type of distribution which accords with the theory of the method, *i. e.*, that the distribution should be exclusive. If we make this assumption, *i. e.*, that the Moluccan is actually the older form, then all the difficulties in accounting for its eastward expansion are at an end,

¹ Ternate and Wettar Is.

for there is time in plenty for this eastern movement to have taken place, and the failure to diffuse toward the west may perhaps be accounted for by the strong competition of the rising Halmaheran type.

Further confirmation seems to be given this view by the fact, noted by Haddon and Müller-Wismar,¹ that in the small islands to the northeast of Celebes and in eastern Java mixed types of attachment exist, in which one boom is direct-lashed and the other uses the Halmaheran form. This would suggest an active penetration by the Halmaheran type of the region where the direct-lashed is the prevailing form. It must be admitted that the positive evidence in favor of the assumption of the greater age of the Moluccan form, in contrast with the Halmaheran, is small; its strength lies mainly in that it seems to clear away the difficulties which the opposite conclusion brings in its train. The discussion, however, at least brings out the point that what is a plausible deduction from partial data, may meet serious difficulties when all the facts, both of distribution and history, are taken into account.

We have devoted a great deal of space to the discussion of the seemingly unimportant details of the number of outriggers used with a canoe, and of the methods by which the outrigger was attached to the booms. But although the facts seem, and indeed are, trifling, their value as illustrating the process of diffusion and of the method of utilizing geographic distribution to determine historical sequence, is great. Let us sum up briefly what the discussion has shown. In the first place, the distribution of the double and single outrigger showed that although the probably older and more primitive double form had a marginal distribution, it also survived unchanged in the probable centre of origin of the

¹ Haddon, *op. cit.*, pp. 95, 113; Müller-Wismar, *op. cit.*

whole trait of canoes with outriggers. As between direct and indirect attachment, the evidence was so contradictory that no really valid conclusion could be reached, but in the case of the direct-lashed and direct-inserted varieties, the marginal principle again held, with again the persistence of the older type in the centre. In the case of the stick-Halmaheran forms of attachment, the simpler older form was marginal, but the specialized later form completely failed to diffuse. The undercrossed and Y-stick types gave evidence of wholly asymmetrical diffusion; the Y-stick-Moluccan showed the same, together with a definite and progressive modification of the newer trait as it diffused. Lastly, in the case of the single outrigger, in the Halmaheran form of attachment found in East Africa, and in the Balinese type, we have evidence for independent parallel inventions, made marginally without relation to the central nucleus of the trait. One might also add, that in some instances we can be fairly sure that migration rather than normal group to group diffusion was responsible for the actual distribution found.

In this single example, thus, practically all the points made in the earlier more theoretical discussion have been substantiated. We did not secure illustration of our conclusions in regard to the difference in the rate of diffusion, nor of the relation between the distance to which diffusion extended and the time consumed. For this the absence of definite historical data is responsible. To secure such, however, in the case of primary diffusion is a matter of great difficulty. For the simpler inventions and discoveries of barbarous and savage folk the data are, as has been said, no longer recoverable; and in the case of the more civilized peoples possessing written records, a new trait has generally spread widely before the record takes notice of it, and such data as exist are often vague, widely scattered, and deeply

buried. No detailed historical studies of the kind needed have, so far as I am aware, been made in this field, and in their absence we must rely, for evidence involving the historical factor, upon the data afforded by secondary diffusion.

CHAPTER IV

SECONDARY DIFFUSION

WE are now in a position to follow our hypothetical trait in its journey by secondary diffusion beyond the limits of the group or culture area of its origin. Such diffusion may take one of two different forms—it may be either continuous or discontinuous. We may begin by a consideration of the former.

As we start from the nucleus or place of origin of any trait and move outward in any direction away from it, we come eventually into a new culture and a new environment. The transition to the new culture may be either gradual or abrupt. As we pass eastward from the plains of Kansas, Nebraska, or Dakota to and beyond the Mississippi valley, the change from the level, treeless plains to the deciduous forests of the Ohio valley and Atlantic coast is very gradual. The utter levelness gives place first to rolling prairie, clumps of trees appear which grow into long tongues of forest with open grass-lands between, until finally the open prairie intervals practically disappear and we have the relatively unbroken forest which once covered all the eastern portions of the United States. The conditions just described were, of course, those of the past, for modern settlement has made great changes in the original state of the country. When the region was still untouched by the European the change in culture in this region, as one passed from west to east, was almost as gradual as that in the environment. For one would have passed from the full nomadic, buffalo culture of the Sioux, let us say, through the

semi-sedentary and semi-agricultural Omahas and Iowas to the strongly agricultural and quite sedentary Algonkian and Iroquoian tribes of the Ohio valley and the Eastern States. Contrast with this the abrupt changes in environment along the eastern front of the Andes, in Bolivia and Peru. Here within a few score miles one may pass from the hot, tropical forests of the "montaña" to the bleak, cold, treeless uplands of the plateau, and, at the time of the first coming of Europeans, from a people of simple, mixed hunting and agricultural culture, to the complex, agricultural civilization of the Inca.

The conditions governing diffusion are clearly likely to differ as between gradual and abrupt transition, and, as the former condition is in general far more frequent than the latter, we may begin with a consideration of the character of diffusion when the transition to the neighboring area is gradual. In the first place, for a trait to pass at all it must, unless the diffusion is due to fashion, conquest, or some involuntary cause, meet a need in the new environment; must, as a rule, find there the requisite opportunity for its existence; and must be appreciated by the people of the new area. The Eskimo blubber-lamp was an invention of great value to this people, for without it it is difficult to see how they could have existed in the arctic archipelago and adjacent coast and Greenland, since any other form of fuel was absent. But indispensable as the lamp was to the Eskimo, it did not diffuse to the neighboring Indian tribes to the southward, for both the need and the opportunity for its use were lacking. The Indians had a sufficient abundance of wood to supply them with this more ordinary fuel, and they lacked access to the marine animals which afforded the coast-dwelling Eskimo the needed blubber.

The absence of need may largely explain the failure of agriculture to diffuse from the Southwest and the borders

of southern California to the tribes of the central portion of the State. In the latter area the natural food supply was not only abundant but very varied. Game was moderately plentiful; birds and fish were abundant; and the acorn, pine-nuts, and various edible roots, berries, and wild grass seed, together with other minor things, gave the people a supply of food which never failed. For, if one variety was temporarily scarce, another could take its place. There was thus no real need for agriculture, although the opportunities for its development were there.

It is true that where the need exists but the opportunity is lacking, the trait may diffuse as a result of the importation of the opportunity by trade. Thus tobacco-smoking diffused from the tribes of northeastern Asia across Bering Strait to the Alaskan Eskimo. The tobacco itself could not be grown by the Eskimo, but the trait became established among them, nevertheless, as well as the local manufacture of pipes, as a result of their being able to obtain tobacco by trade with the peoples across the strait, who in turn secured it from the Russians. This case is particularly striking, since it involves the growth of a new local industry, that of pipe-making, wholly based upon the introduced trait.

A failure to diffuse due to lack of appreciation is apparently well illustrated by another example from this same area. The Chukchi on the Asiatic side of Bering Strait, together with other tribes in northeastern Asia, made use of the domesticated reindeer. With the Chukchi the Eskimo were in fairly close trade relations. The reindeer of northern Europe and Asia (*Rangifer tarandus*) is generally regarded as of the same species as the barren-ground caribou of North America, so that the Eskimo possessed equally with the Chukchi the opportunity for its domestication and use. They had, further, essentially the same needs, which the reindeer (or caribou) satisfy, *i. e.*, food

and transportation. They had an efficient sledge, with dog haulage, as the Chukchi had had previously, but the latter substituted the reindeer for dogs at a relatively early date. In spite, however, of the presence of both need and opportunity, and in spite of the abundant chances in the course of their mutual trade, to see and appreciate the value of the reindeer to the Chukchi, the Eskimo appear never to have made the slightest effort to domesticate and use the American variety.

In other words, diffusion beyond the group of origin depends primarily, just as it does within the group, on the triad of opportunity, need, and appreciation; if one or more of these are lacking, the diffusion is unlikely to take place. Further, as in the case of primary diffusion, a trait to diffuse must be congruent with the new culture into which it seeks to pass; otherwise, like an invention that is ahead of its time, it must needs have great dynamic force to make its way. Thus the Middle American calendar, invented and perfected by the Maya in Guatemala, as early, it is believed, as the seventh century B. C., did not spread southward to any considerable extent among the neighboring less-civilized tribes extending toward the isthmus. Their culture was so much more simple and unelaborated and was lacking in so many of the associated traits which made the Maya calendar of value, that its adoption would have been almost as incongruous as that of calculus would be among the West African Negroes.

If the conditions, however, are such that diffusion takes place, it may be observed that as the environment and cultural transition is gradual there is abundant chance for modifications to be easily made in the trait, if these are necessary because of changed conditions. Thus the use of the birch-bark canoe, so characteristic of many of the eastern Algonkian tribes, undoubtedly diffused from them to the

Iroquois of New York, in whose territory the birch became gradually less abundant as one went south and west. The Iroquois were therefore forced to replace birch bark by that of the spruce or elm, which was heavier and less well-adapted to the purpose, but this modification of the trait was relatively easily brought about by the gradualness of the change.

The modification suffered by the trait in passing into the new environment may not be one in the structure of the trait itself, but only in its status within the culture of the neighboring people. A trait which is an important and integral part of the culture of the group in which it originated, may pass by diffusion, thus, into a near-by culture, to play there a very subordinate part. Thus to revert to an instance mentioned a moment ago, agriculture, which was a fundamental element in the culture of the Pueblo tribes of the Southwest, and actually vital to their existence, spread to the neighboring tribes of southern California, in whose culture, however, it played a distinctly subordinate rôle; so much so, indeed, that until recently a knowledge of agriculture among these tribes had been denied.

Such a change of status may be due to the change in physical environment, as in the instance just cited, or may be primarily the result of a difference in pattern of the culture into which it is taken. Thus wood-carving is a trait highly developed among the tribes of the northwest coast of North America. It has diffused from them to the neighboring inland tribes, but only slightly, and among them plays a relatively insignificant part in their culture. This would seem to be in large part due to the differences in cultural pattern, for there is no lack of wood from which the carvings could be made. This difference in culture pattern may also bring about real structural changes in the trait. As Wissler¹ points out, where the use of maize spread to

¹ Wissler, C., "Man and Culture," New York, 1923, p. 124.

Europe from America the new grain was sowed in the same fashion as the grains which European peoples had been growing for thousands of years, and not planted in hills, as was the Indian custom.

The factor of culture pattern may be so strong as to totally inhibit and prevent diffusion. Thus, in various parts of Melanesia we find pottery made in certain villages (where it most probably was introduced by pottery-making immigrants), whereas in neighboring ones its manufacture is wholly absent. Clay is often as available to the one village as the other and both have the same needs; appreciation of the value of pottery is in no sense lacking, for the people of villages where no pottery is made are abundantly supplied with it by trade with their pottery-making neighbors. Need, opportunity, and appreciation are thus all present, the product itself is in use, yet still the trait of manufacture does not diffuse. The only apparent explanation seems to be that custom and conservatism are so strong, that despite centuries of close contact this very desirable trait has not been adopted. The religious conservatism of Islam, which prevented its accepting the art of printing from China, is another very striking example of the strength which culture pattern may exhibit. A further instance is the failure of the Chinese to adopt the use of milk and milk products from the pastoral nomads along their western and northern frontiers, with whom they have been in close contact for at least four thousand years.

Diffusion again may be retarded or even prohibited by the new trait having to compete with an already established one serving an analogous or identical need. Thus, to a people already possessed of the bag-bellows, the pump-bellows might have no particular appeal, since its efficiency is not greater than the implement to which they are accustomed.

The vicissitudes of a trait in diffusing from one culture and environment to a neighboring one, to which the transition is gradual, have now been discussed and illustrated at some length. We have seen that a trait may become modified in the process of diffusion, either as a result of the changed environment, or of the culture pattern of the new folk, and that, on the other hand, it may fail to diffuse because of lack of need, opportunity, or appreciation, or be blocked effectively by conservatism. It should, however, not be forgotten that traits may pass quite unchanged. It is difficult, however, to determine with certainty how frequent such diffusion is in relation to that where some modification occurs, for our knowledge of the history of cultural traits is, for most of the earlier and simpler ones, still extremely scanty. It seems probable, however, that in the majority of cases some change is likely to take place. It is further obvious that there is no reason whatever for believing that a series of different traits will all have the same history. One may pass into the new environment or culture unscathed, another may suffer change in structure or status, whereas a third may altogether fail of adoption. It is also quite clear that in respect to their fate in diffusion, traits of different kinds fare differently. Material traits, on the whole, seem to diffuse most readily and not infrequently with little change. Religious traits probably come next in facility of diffusion, and, although often subject to modification, not infrequently pass into the new culture almost unchanged. Social traits seem of all the least diffusable.

If we turn next to diffusion as it operates between two areas or cultures where the transition is abrupt, it is clear that the difficulties in the way, as well as its risks, are greater. The abrupt difference in physical environment is likely to be paralleled by an equally sharp change in oppor-

tunities and needs, which, lacking any transitional zone, are likely to serve as barriers. The blow-gun with its poisoned darts was useful to the tribes of the upper Amazon tributaries in their forest habitat, and there all the materials were at hand for its manufacture. But on the barren, windy uplands of the Andean plateau there was little use for such a weapon, and the materials for its construction were lacking. So we are not surprised to find that diffusion did not occur. Or, again, in the case of tailored clothing, which was characteristic of the people of Tibet, and which did not diffuse to any extent from them into the hot, moist plains of northern India, only a hundred miles or so away, for there close-fitting garments were neither needed nor comfortable. Yet Buddhism, born and bred in these same plains, did spread in the reverse direction. It should be noted, however, that very abrupt transitions in environment and culture are, on the whole, rare, and that, where they exist, the barrier is more effective, as a rule, against material than non-material traits. Further, that there being little or no opportunity for any modifications of the trait to take place in transit it is perhaps more likely, if it pass at all, to do so unchanged.

Summing up the discussion of this phase of the problem of diffusion, we may say, (1) that traits in diffusing from one culture and environment to a neighboring one are subject, as a rule, to some degree of change, which may be variable not only in amount, but also in kind, since it may be a change either in structure or status or both; (2) that different traits are differently affected by the process; and (3) that not infrequently the barriers of differing environment and of conservatism and culture pattern suffice wholly to prevent the passage of a trait.

At this point it is necessary to consider sundry other aspects of the diffusion of traits from one culture to an-

other, to which we shall need to revert at a later stage. We must, in the first place, inquire in a little more detail into the actual mechanism of diffusion itself. In considering the phenomenon of primary diffusion within the group of origin, it was pointed out that adoption of a new trait might be powerfully stimulated, on the one hand, by demonstration and persuasion, and, on the other, by fashion. It was further noted that with or without these stimuli, diffusion was brought about as a result of intergroup, intervillage or intertribal contacts, of intermarriage, of individual or family migration, or of conquest. Diffusion from one culture area or environment to a neighboring one rests on the same factors. It must be remembered that, as noted in the introduction, a culture area has, as a rule, no sharp boundaries. Toward its margins its characteristics gradually become less numerous and less prominent, and traits of the adjacent culture begin to appear. Social contacts in the way of trade or of social or religious gatherings are consequently continuous across the cultural penumbra and into the neighboring area. Warfare, where it occurs, does not here, any more than within the culture group, entirely prevent such contacts. It is to be noted, further, that trade may here be of even greater importance in spreading traits than within the group, since the products of another environment and culture may be eagerly sought. Thus, the dentalium shells of the Pacific coast and the dried salmon of the lower Columbia River ground to meal and packed in baskets, were both much esteemed by the tribes of the semi-arid region extending from the Cascades eastward to Wyoming, Idaho, and Montana, and even by the tribes of the Western plains. So that a considerable trade in these articles developed, buffalo-hides travelling back westward in exchange. With the trade went various minor cultural traits characteristic of the Plains, which in this way reached

the Pacific coast. In the Old World the significance of the great trade and caravan routes is well known, the outstanding example perhaps being the silk-ways which linked China with the Mediterranean world.

As within the culture area, so also between two neighboring ones, intermarriage exerted a strong influence in the diffusion of cultural traits, for such marriages were not unknown even between groups constantly at war. Thus, during the early history of China, although the village-dwelling, agricultural Chinese were always at war with the Hiungnu and other nomad, pastoral folk of the Mongolian steppes, there was, nevertheless, constant intermarriage between the two people along the borders. Even where normal intermarriage was of little consequence, the taking of war captives as wives gave the same opportunities for trait diffusion. So, also, the less common practice of adopting male captives or their utilization as slaves.

Individual migration is perhaps of lesser consequence as between two contrasted cultures than it is within a single culture, yet may not wholly be neglected, for not infrequently fugitives fled far across cultural borders, and occasional wandering and adventurous spirits were found even among quite primitive folk. The migration of small groups also is important, as, for example, where the little band of fugitives fled from China at the end of the Chou dynasty and seem to have taken refuge in Japan, where they may have been the first to introduce features of Chinese culture.

Military conquest, lastly, may be a factor of great importance. In the New World the influence of the Inca and of the Aztec and their Toltec predecessors was conspicuous in this respect. In the Old World the Chinese conquest of the region from the Yangtse south to Annam, the Hindu conquest of the Deccan and Ceylon, and, later, the Mohammedan conquests, not to speak of the many cases in the

Near East and Europe, abundantly illustrate the far-reaching cultural diffusions which have been brought about by conquest.

The rapidity with which diffusion takes place, whatever be the means by which it is accomplished, varies within extremely wide limits. Historically it seems probable that the rate has, on the average, been a constantly accelerating one. In the early stages of culture, in Palæolithic or Neolithic times for instance, diffusion must have usually and for most traits been extremely slow. This is generally assumed on the basis of the smallness of the population at the time, supposedly broken up into small units widely scattered. Under such circumstances contacts are assumed to have been infrequent, and consequently the opportunities for diffusion very limited. Now, although no one would deny the general truth of the conclusion that dissemination was ordinarily very slow in Palæolithic times, let us say, yet there are facts which should lead us to accept the dictum only with qualifications. Such facts, are, for example, the uncanny rapidity with which news sometimes travels for hundreds of miles among relatively primitive peoples with none of our modern facilities for quick transmission. Although much mystery has been made of some such instances, there seems no good reason to doubt but that in the main they are explicable on the ground of the unappreciatedly rapid spread of rumor. Other instances are the very rapid spread of individual songs used in the corroborri dances of natives of Australia, instances having been reported where a new song has spread completely across the continent in a single year. If such remarkably quick transmission of a trait is really substantiated, its evidence is of no little importance, for in Australia the population was extraordinarily sparse and of primitive cultural type.

Another instance of relatively rapid diffusion is the fre-

quently mentioned one of the spread of the horse among the Indians of the Plains. Here we have good reason to believe¹ that the knowledge and use of the horse, first introduced by the Spanish in the south about 1540, had spread throughout the whole area of the Plains to and beyond the Canadian line in a period of about a hundred and fifty years, or perhaps less. So that if a song can be diffused for two or three thousand miles among a primitive folk in the short space of a year, or the use of the horse spread over the Plains in a century, it behooves us to go a little slowly in assuming that there could not have been occasional instances of fairly rapid diffusion in the early history of culture.

An important aspect of the process of diffusion not yet taken into consideration, is that of the effect of considerable differences in grade of culture between the diffusing and the receiving groups. It is sometimes assumed that traits diffuse only from a higher to a lower culture, on the basis that the former has traits which the people of the latter desire and need, but who can give to folk of higher culture nothing of value in return. It is, of course, true that people of higher culture have many traits which would be of use to their less advanced friends, or traits, which, even if actually harmful, these would much like to possess. But it must not be forgotten that there are numerous traits of the higher culture which, if the gulf that separates the two is wide, may be incommensurate with the lowlier culture, and so not be amenable to adoption. Or, in the case of material objects, they may be ardently adopted, but only as trade products, the more primitive folk being quite unable to make the article for themselves. Thus the superiority of matches over the fire-stick or flint and steel leads every savage people to desire them, and, if trade facilities are ade-

¹ Wissler, C., "The Influence of the Horse in the Development of the Plains Culture," *American Anthropologist*, vol. 16, pp. 1-25.

quate, their use supplants the more primitive methods which are thus entirely discarded. Yet the savage does not and cannot make matches for himself. The silk-ways across Asia supplied Rome with silk, yet, although the material was long used, it was centuries before silk manufacture entered Mediterranean culture as a trait. Such cases of the use of products of a higher or different culture are not, strictly speaking, cases of true diffusion at all. It is obvious, then, that we must make a distinction between the transfer from one culture area to another, of the use of a material product supplied by trade, for their supplies of which the one culture is dependent upon the other, and the real diffusion of a cultural trait such, let us say, as the making of wine, or the use of an alphabet.

Non-material traits in their diffusion from a higher to a lower culture seem generally to be considerably modified if the gap between the cultures is wide. Thus Buddhism spread from the highly cultured Hindus to the much less-developed Tibetans, but suffered in the change. So Christianity among many savage peoples to-day, or at first among the barbarian tribes in Europe, although it exhibits or exhibited the outward forms of orthodoxy, is and was inwardly often a fantastic mixture of old and new beliefs and a mere travesty of the real faith.

That diffusion is effective only from a higher to a lower culture is, of course, by no means true. The Chinese, during the period when they were still mainly confined to their cultural hearth in the region of the bend of the Yellow River, had no knowledge of boats or navigation. Yet as they expanded eastward and came in contact with the less-cultured folk of the coastal districts, they learned from them the use of boats and developed the sampan and junk, two very efficient types of craft. The practice of chewing the betel-nut, which has long been practised in India, seems

probably to have been adopted by the Indian population from the lower-cultured peoples of the Indo-Chinese and neighboring Indonesian area, at the period of their first contacts there, about the beginning of the Christian era. Although it is true, thus, that diffusion works both ways, traits diffusing from the lower to the higher as well as from the higher to the lower, it is nevertheless clear that the current is normally far stronger in the latter direction than in the former.

We have seen that traits in diffusing across cultural and environmental borders commonly undergo modification in some manner and degree. We have also seen that traits, even in their area of origin, are not immutable, but usually undergo change in the course of time. This same liability to modification as a result of lapse of time, applies, naturally, just as well to the trait which has come into a culture as a result of diffusion. The conditions of the new culture and environment are, however, different from those in the old, so that the modifications which such an exotic trait may undergo, are likely to be somewhat different in kind or degree from those in the area from which it came. Accordingly, a certain differentiation of the trait as between the two areas may ensue, which will ordinarily be the greater the longer the time which has elapsed since the diffusion originally took place, and the greater the difference in environment. Admirable examples of this phenomenon may be found in the history of the alphabet, a trait which provides us with almost unique opportunities to trace the results of diffusion in space as well as in time.

We have so far only considered the case of diffusion as regards the passage of a trait from one culture and environment to a neighboring one, but it is obvious that the process does not necessarily stop there. From its area of adoption the trait may, as in the first instance, diffuse farther afield.

It is equally clear, however, from what has been said, that a trait after diffusing from culture *A* to culture *B*, is likely to have undergone some change, so that when it passes on from *B* to *C* it is no longer the same trait with which we started. In other words, in the case of progressive diffusion, the modifications which may be suffered by the trait are cumulative.

The process of continuous diffusion which we have been discussing is, by definition, continuous in space; it is not, however, necessarily so in time. The rate at which diffusion progresses may, as we have seen, vary widely, so that a new trait may sometimes be quickly accepted, or in other instances may only slowly and with difficulty make its way. Diffusion may also fail entirely for a considerable period, but be successful in the end, so that its progress may be fast or slow or intermittent, with longer or shorter pauses. Now a culture area is normally in contact with more than one other; may, indeed, impinge on three or four, so that the experience of a trait in diffusion in the direction of one neighboring culture may be of one sort, whereas in the direction of another it may be wholly different. As a result, we find that in secondary diffusion, just as in primary, a trait spreads erratically and unpredictably. Its progress is not at all comparable to the spreading concentric ripples formed by a stone thrown into a placid pool, or that of a drop of oil on the surface of water. Far more it may be compared with a forest fire, racing ahead here, lagging behind or dying out there, smouldering for a long time to burst out again afresh, or carried as a spark far across intervening territory to blaze up at a distance, and always at the mercy of the winds of chance. And since different traits in their diffusion behave differently, the phenomenon of diffusion between any two adjacent culture areas is clearly a very complex one, some traits passing rapidly,

others lagging behind, some passing unchanged, others only after some degree of modification, and the whole going on in both directions across the cultural border. Lastly, just as in the case of primary diffusion, the trait nucleus did not necessarily lie at the geographical centre of the culture area, but might be marginal, so here the area in which a trait first arose, may be located either centrally or marginally in the whole territory over which it ultimately spreads.

How far do concrete examples bear out these general statements? Let us turn to a few illustrations and see. We shall be obliged, as in the previous instance of primary diffusion, to utilize to some extent the method of geographic distribution, since historical data on the diffusion of most widely distributed traits is largely lacking.

We may take first a relatively simple case, that of the dispersal of the blow-gun in the New World. The distribution of this weapon has been studied and discussed more or less fully by several investigators,¹ of whom Nordenskiöld is the latest and probably the best. Putting together the available data, we find the distribution of this very distinctive trait to be that shown in Figure 16. The blow-gun consists, as is well known, of a tube through which a very light dart is blown by means of a puff of breath. It is found in the New World in several different forms, (1) a simple tube of cane, (2) a cane tube inserted in a hollowed-out palm stem, (3) a cane tube covered by two semi-cylindrical pieces of palm, and (4) two semi-cylindrical pieces of palm bound together, forming an even-bored tube. A related form of the implement is that in which a small pellet of clay or pebble or round seed is blown, *i. e.*, a bean-blower. The darts

¹ Friederici, G., "Die geographische Verbreitung des Blasrohrs in Amerika," *Petermann's Mitteilungen*, vol. 57, pp. 71-73.

Schmidt, P. W., "Kulturkreise und Kulturschichten in Südamerika," *Zeitschrift für Ethnologie*, vol. 15, pp. 1014-1124.

Nordenskiöld, E., "The Ethnography of South America Seen from Mojos in Bolivia." Göteborg, 1924, p. 59 *seq.*

used with the fully developed blow-gun may be plain darts, or may have their points smeared with a very rapidly acting poison. Now reference to the Figure 16 shows that the whole area of distribution is exceedingly irregular, a large, probably continuous area in South America sending out a short arm through the isthmus as far north as Mexico, and a long arm through the Antilles to the southwestern United States, where the area again expands.

There is no question but that the blow-gun diffused from the southern to the northern continent, so we may first turn to the former area and note a few of the details.

In the first place, it will be seen that although there is a broad general similarity in the environment and culture of the whole great Amazon-Orinoco basin, the blow-gun has not diffused itself at all into the eastern portion thereof. Further, that, with two exceptions, it has not crossed the Andean chain to reach the Pacific coast. In one of the cases (that of the Colorados, in Ecuador) it is not the true blow-gun which is in use, but only the pea-shooter; in the other (on



Figure 16.

Distribution of types of blow-gun in America.

1. Plain cane. 2. Cane in hollowed palm-stem. 3. Cane covered by semi-cylindrical pieces of palm. 4. Two semi-cylindrical pieces of palm bound together. 5. Blow-gun, form unknown. 6. Pea-shooter type, in the north, with regular blow-gun (form uncertain) in the south, except in Ecuador, which has pea-shooter.

the Peruvian coast) we have only the somewhat uncertain evidence of a design on a single bit of ancient textile, no actual blow-gun or dart ever having been found. We seem thus to have an illustration of the failure of the trait to cross the barrier of radically different environment which the Andean highlands and arid Pacific coast affords.

Turning to the types present, it will be noted that the simple cane tube (which is obviously the most primitive form) occurs only on the southern and northern margin; that, the most elaborately developed and specialized form (type 4) is found mainly along the Amazon and its southern headwaters, whereas the other two intermediate types, which still preserve the use of the original cane tube, are found on its northern tributaries and on the Orinoco. The region of highest specialization is thus marginal to the area as a whole. The short arm which extends northward into Mexico, passing out of the environment and cultural forms of the southern continent, ends not with the true blow-gun, but the pea-shooter form, which among the Aztecs was a favorite toy for shooting small birds. Beyond here, however, the implement did not spread. The type of blow-gun in use in the Antilles is not known with complete certainty, but seems to have been definitely a blow-gun rather than a pea-shooter. In the United States we return to the primitive form, a plain cane tube. We may note, further, that although in the main area in South America the blow-gun darts are, over a large area, poisoned with curare or other poison, this use of poison seems, from various bits of evidence, to be a relatively late development which has spread considerably in historic times. It never reached the northern continent, and seems to have been lacking in the Antilles; indeed, in the United States it could not have been in use, as the requisite poisonous materials are not to be had.

Briefly, then, we find the blow-gun attaining its highest

development in an area which is at the extreme southwestern margin of the whole area over which the trait ultimately diffused. The trait was unable to pass the environmental barrier raised by the Andean uplands and arid Pacific coast; it did not diffuse southward into the great Chaco area, nor eastward even throughout the whole of the Amazonian forest. Where it spread northward into Mexico it became modified into the harmless pea-shooter; where it spread into the Gulf States and north to the Great Lakes, among the Iroquois, it was in its oldest, most primitive form. Of its rate of spread and of the details of its history we have no record.

As a second example, we may turn to one employed by Doctor Wissler as a demonstration of the central location of the trait nucleus and of the zoned, concentric diffusion which he believes is the universal type. The trait studied is that of the moccasin, the type of soft foot-covering worn so widely by the Indians over considerable portions of North America. Following Doctor Wissler, we may divide moccasins into five different types, which we may letter from *A* to *E*. It is unnecessary for our purposes to go into the details of their difference, suffice it to say that *A* is the simplest in its construction, and that the series grades up to *E*, which is the most specialized form. After describing the differences between these five types, Doctor Wissler says¹ that "their distributions are mutually exclusive," *i. e.*, that one type and only one is in use by any particular tribe, and he then gives a sketch-map, reproduced here in Figure 17, to show the distribution of the several forms. The simplest type (*A*) is, he points out, marginal in its distribution in relation to the others, and adds that types *C*, *D* and *E*, as the more specialized types are "central in distribution." It is difficult to understand this statement, for (1) type *B*

¹ "The Relation of Nature to Man in Aboriginal America," p. 23.

is just as marginal as *A*, and (2) type *E*, which is the extreme of specialization, is also completely marginal. If the area of greatest specialization represents the centre of diffusion of the trait as

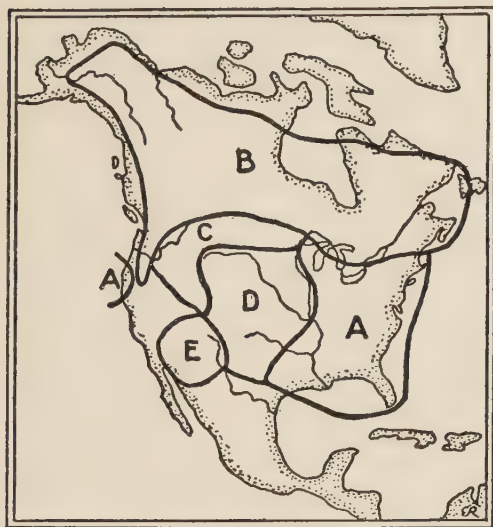


Figure 17.

Distribution of moccasin types in North America.

(After Wissler.)

A, one-piece; B, three-piece; C, two-piece; D, hard-sole;
E, turned-up sole.

a whole (as according to the theory set forth by Doctor Wissler it must), this centre is marginal and not central, and type *B* is then more truly marginal than *A*. Furthermore, if the theory advocated is correct, then type *E* must occupy the area where moccasins as a trait are oldest, but we know definitely from archaeological data that formerly sandals

and not moccasins were the universal foot-coverings here used.

The moccasin is not, however, confined to North America, for a form belonging to type *B* is in use in Siberia, in the lower Amur region and the island of Sakhalin,¹ and also by the Lapps in northern Europe. Doctor Wissler states that "from the data available, this type once reached from Kamchatka across northern Asia into Europe" and

¹ Doctor Wissler erroneously places the Asiatic moccasins in Kamchatka. See, for the actual data, Hatt, G., "Moccasins and Their Relation to Arctic Footwear," *Memoirs, American Anthropological Association*, vol. 3, pp. 149-250.

was thus formerly continuous in its distribution "from Maine to Sweden."¹ At the present day there is no known



Figure 18.

Schematic world distribution of moccasin types.

(After Wissler.)

use of the moccasin, however, anywhere between the Amur and the Lapps, although from the character of the form of

¹ *Op. cit.*, p. 25.

boot worn by the intervening peoples, Hatt¹ concludes that a true moccasin must once have prevailed throughout. Following Hatt, Doctor Wissler then notes that in southern Scandinavia and the whole of northwestern Europe there is evidence that in earlier times, as, for example, in the Middle Ages, a simple, moccasin-like foot-covering resembling type *A* was in use, and then observes that this area is marginal to the arctic belt of actual or inferred distribution of type *B*. Putting the Eurasiatic data together with the American he then presents the total distribution of the moccasin in a second map, reproduced in Figure 18. He then draws the conclusion that type *A* is the original, primitive form, which at some time encircled the globe following the forested areas of the northern hemisphere. Later, several clearly allied forms evolved from this, which, as type *B*, again diffused around the world, crowding back the surviving type *A* into marginal regions. Still later, the more specialized form *C* evolved in the interior of the North American continent and was followed by *D* and finally *E*. In other words, the place of origin of the moccasin trait lay in the arctic and subarctic forest area presumably of Asia, whence it spread to Europe and America. A new development (type *B*) occurring in the same region, again spread over the same territory, after which further specialization occurred only in North America. As a matter of fact, the specialization in Asia, resulting in the present form of moccasin-boot, is just as significant in this respect as the American later forms, and partially, I believe, parallels the latter case. For this Asiatic development owes something of its origin to the influence of the central Asiatic boot, and is an instance of marginal modification as a result of contact with a trait in an adjoining area. In America, types *D* and *E* are hard-soled moccasins, and may owe their form to the

¹ *Op. cit.*, p. 234.

suggestion afforded by the sandal which formerly prevailed in part, at least, of the area, where they are known.

Now it will be observed that there is something of a contradiction in the argument as presented by Wissler, for whereas in speaking of the North American area alone he locates the centre of specialization in the Southwest, where type *E* is found, when speaking of world distribution the centre of origin is placed in the arctic forest region of Asia. Now one cannot "run with the hare and hunt with the hounds," and if the Asiatic region is the nucleus of the trait, then specializations do not invariably arise in the nucleus. In the case of primary diffusion we have already seen that marginal specializations are frequent and that the nucleus has no monopoly in the matter of invention. The same is true here on the larger scale. As I see it, the matter is to be explained quite simply along the lines previously suggested. That the moccasin as a trait arose in northern Asia seems quite probable. It spread by diffusion and migration to the New World, and there, in the forested regions, preserved the older forms. When, in the course of further diffusion, it reached the Plains and the area of the arid Southwest, it developed new specializations along its margin, just where one might expect them to occur, as the trait advanced into sharply differing environmental conditions.

One other point needs to be mentioned. In his discussion of the problem Doctor Wissler explicitly states that the distribution of the several moccasin types are "mutually exclusive." It is hard to reconcile this statement with the data which he says he has used,¹ for reference to these sources shows that actually this is far from being the case, since there are numerous examples where tribes use two or more types at the same time. Thus type *A* occurs in areas

¹ Hatt, G., *op. cit.*; Wissler, C., "Material Culture of the Blackfoot Indians," *Anthropological Papers. American Museum of Natural History*, vol. 5, pt. 1.

marked on the map as exclusively *B*, *D*, or *E*; type *B* occurs in areas shown as *C* and *D*; and type *C* in the area marked *D* as well as type *D* in the area marked *C*. In some instances these are among border tribes, but by no means in all. The survival of these more simple types within the areas of the more advanced, adds probability to the developmental sequence of forms which Doctor Wissler has proposed, as well as to the suggestion here made that these are to be regarded as successive specializations in the course of normal diffusion.

We may now somewhat more briefly consider a second example, also discussed by Doctor Wissler, that of the world distribution of the different methods of arrow-release. The term "arrow-release" is used to designate the various methods in which the butt of the arrow is held in shooting with the bow. Morse, in his original study of this trait,¹ divided all known forms into five principal types, *i. e.*, primary, secondary, tertiary, Mediterranean, and Mongolian. The differences between these may be best indicated by reference to the following table taken from Kroeber's recent paper on the subject:²

	PULL ON	PULL BY	BUTT BETWEEN	UNIQUE IN
Primary	Arrow	1 + 2 kn	1 + 2 kn	Arrow-pull Combination pull
Secondary	Arrow + string	(1 + 2 kn) + 3 (+ 4)	1 + 2 kn	
Tertiary	String	2 + 3 (+ 4)	1 + 2	Thumb not used
Mediterranean	String	2 + 3 (+ 4)	2 + 3	
Mongolian	String	1 (+ ring)	1b + 2b	Thumb-pull

kn = knuckle; b = base. The numbers refer to the fingers, counting the thumb as 1. The "ring" in the Mongolian form is a special form worn on the thumb to protect it from the string-pull.

¹ Morse, E. S., "Ancient and Modern Methods of Arrow-Release," *Bulletin Essex Institute*, vol. 17, pp. 145-198 and subsequent paper, Peabody Museum, Salem, Mass., 1922.

² Kroeber, A. L., Arrow Release Distributions, *University of California Publications in American Archaeology and Ethnology*, vol. 23, no. 4.



If we plot the known distributions of these forms on the map we get the result shown in Figure 19. Summed up briefly this shows that the primary type has in each continent a roughly marginal distribution; the secondary is found only in the New World; the tertiary is found most widely in the New World also, but occurs with some frequency in southeastern Asia and adjacent islands and is reported from two near-by tribes in Africa; the Mediterranean is again marginal with the exception of one spot in Africa; the Mongolian occurs mainly in continental Asia, with two or three somewhat doubtful cases in Africa and one in North America.

What can we make out of this? Does the known distribution suggest a single centre of invention, where all these forms were invented and from whence they spread in sequence? In Doctor Wissler's view they do, and he arrives at the conclusion that in the forms of arrow-release we have a typical instance of concentric zonal diffusion, as follows: First the primary, secondary, and tertiary types are lumped together as merely varieties of a single primitive form. This gives then only three types to consider, the composite "primitive," the Mediterranean, and the Mongolian. Plotting these on a map he then gets the result shown in Figure 20. From this the conclusion is drawn that as the Mongolian is the most specialized type and occupies (as shown) a broad belt stretching across the whole of Asia, bordered by bands of Mediterranean, one of which is again bordered on the margin by the "primitive," therefore the central Asiatic area is the centre of origin of all methods of arrow-release, which arose here successively and diffused outward. The isolated occurrence of the Mongolian type in California is regarded as an independent invention; nothing is said as to the similar isolated area of Mediterranean in eastern Brazil. The fact that the single

case of Mongolian type in California is bordered by Mediterranean and this in turn by the "primitive" is regarded as a replica of the conditions in the Old World.

Now it may be observed, first, that the lumping together

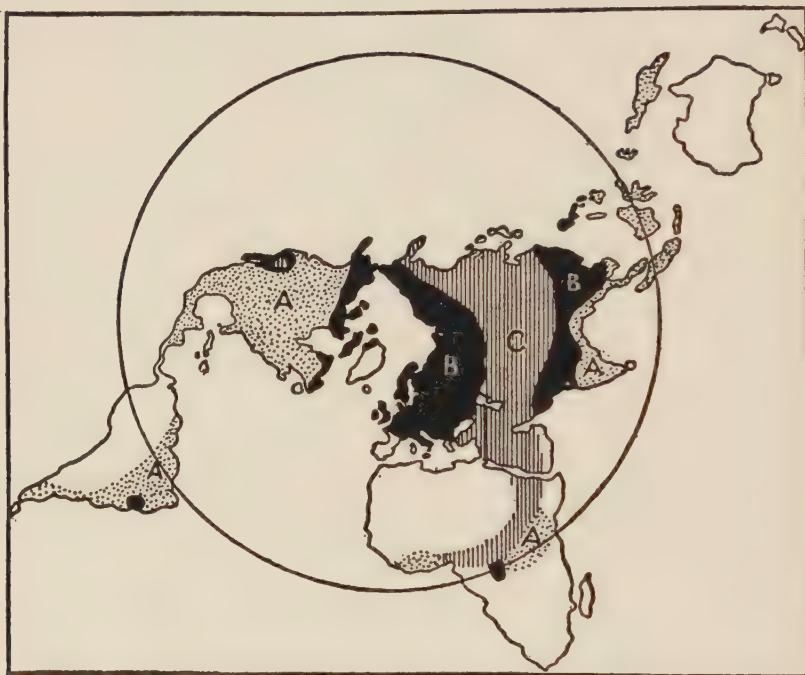


Figure 20.

Schematic distribution of the "Primitive" (A); Mediterranean (B); and Mongolian (C) methods of arrow-release.

(After Wissler.)

of the first three types is really unjustified, since the tertiary is really closely allied to the Mediterranean, both being "string-pulls,"¹ and that there are intermediate forms between the two just as transitional as the secondary is between primary and tertiary. There does not then appear to be a valid reason for artificially contrasting the group of

¹ Kroeber, A. L., "Arrow-release Distributions," p. 295.

the first three with the fourth, since all intergrade. Secondly, reference to Figure 19, showing the actual distribution of types as known, will show that there exists no justification whatever for the continuous band of Mediterranean type from Scandinavia to Bering Strait placed by Wissler on his map (Figure 20), for there are no data for any portion of this area. His map is further erroneous in that (1) it shows all Mesopotamia and most of Arabia as using the Mongolian type, when the data explicitly state that the Mediterranean was in use, and (2) it shows the larger portion of China as having the Mediterranean type, whereas it is unknown there and only appears in eastern Asia at one point, *i. e.*, Cambodia. When thus corrected the map fails to reveal any satisfactory zonal, concentric distribution for the world with an assumed centre in inner Asia.

Let us return to the distributions as shown in Figure 19 and see whether simple straightforward diffusion, with the aid of known historic facts, will not enable us to explain the larger part of the situation. The original form of arrow-release is wholly unknown; but on the basis of its obviousness and its very wide distribution we are probably right in assuming it to have been the primary, and that the place of origin was somewhere in the Eurasian continent. It seems probable that this type diffused ultimately over the whole of Eurasia. The natural sequence then would seem to lead through secondary to tertiary and Mediterranean, but the total absence of the secondary in the Old World raises the question whether it is really an essential step. Kroeber suggests that it may not have been, but arose in an attempt to imitate the tertiary. At any rate it appears to be an exclusively North American type. If we assume the probability of development directly from primary to tertiary in the Old World, we then find its distribution es-

sentially confined to the marginal regions occupied by the dark-skinned peoples, or once occupied by them. Since there are transitional forms between the tertiary and Mediterranean there seems no reason to doubt the sequence in development. Where this specialization took place is not clear. We know definitely that it was in use in Egypt as early as the twentieth century B. C., was established in Assyria a thousand years later, and was the type brought by the Hindus when they came into India in the second millennium B. C. from Turkestan. So it seems probable that its centre of origin lies somewhere between the eastern Mediterranean and the Caspian basin. Its spread from the Mediterranean into Europe is easily understandable, and we have good reason to believe that the cases in Ceylon, Cambodia, and the Philippines were due to the extension thither of Indian culture during the early centuries of the Christian era. It seems probable, although there is no concrete proof of it, that the whole of western Asia had the Mediterranean release before the incoming of central Asiatic influences. That the Mongolian type had its rise in inner Asia seems practically certain; as certain as that this was *not* the area where the Mediterranean type arose. Its use is established in China as early as the beginning of the first millenium B. C. and there can be little doubt that its diffusion so widely in Asia was due primarily to the expansion of the Chinese and Turko-Tartar peoples. There is no evidence of any genetic connection of this type with the Mediterranean; it was a quite independent specialization from the earlier types, occurring in a special environment, central in the Asiatic continent, whereas the Mediterranean was marginal.

For the New World we have, in general, a parallel development. It is generally assumed that the earliest immigrants to reach the continent from Asia came possessed of

the bow, and we may with fair safety add to this assumption that it was the primary release which they used. As they spread over the New World, local centres of specialization grew up, with the possible intercalation here of the secondary type as a transition to the tertiary. These centres of specialization are, so far as our present knowledge goes, marginal for the Mediterranean and Mongolian, the tertiary occupying the great mass of the interior of the northern (and probably also southern) continent. So far as any evidence goes, the Eskimo and the southwestern areas of Mediterranean type have no connection whatever, and indicate two parallel independent inventions of this type. The single instance of the Mongolian form is also wholly independent, and is a case of convergence, since it is analogous to, but not homologous with, the true Mongolian type. For South America and Africa the data are too scanty to warrant any definite conclusions as yet.

All in all, the data for the distribution of the methods of arrow-release show clearly, I believe, that we have not here a case of wide-spread diffusion, except in the first instance of the primary type. From this developed a series of other forms, growing out of the primary as a result of local development, in centres often marginal. In Eurasia, the Mediterranean later diffused itself widely as a result largely of popular movements and direct cultural contacts, and the same was true for the Mongolian. The New World repeated the process, there being no evidence for the diffusion to it of anything other than the primary type.

A third example, in this case of pure and wide diffusion, and one replete with significance, is to be found in the spread of the alphabet. Allusion has been made to certain phases of the case already, but we must here take a brief view of its whole amazingly complex and interesting history. Leaving aside as not directly germane to our pur-

pose the questions of the exact date and manner in which the early Semitic alphabet came into being, we may start with it in its two main forms, the northern and southern, both of which probably date back to or beyond the beginning of the first millenium B. C.

This early Semitic alphabet was a purely consonantal one, having no signs for vowel sounds, but in this form was well adapted to the peculiar character of Semitic speech. From this centre of origin at the eastern end of the Mediterranean the alphabet diffused along four main lines. Following first the western or European branch, we find the Greeks taking over the Phœnician form some time prior to the seventh century B. C. In so doing they made relatively little change in the forms of the letters, but owing to the accidental difference in the phonetic character of their language were forced to develop signs for the vowels. This they did by utilizing some of the letters whose original sounds did not occur in Greek. We have here, then, a definite modification taking place in the trait as a result of diffusion into a different culture and environment. From Greece, before the new trait became fully standardized, one variety of the alphabet spread to Italy, in which process further changes were made. From Italy the Roman form passed into central and western Europe with still further changes, including the development of capitals and of decorative forms like the Gothic, which survives in use in Germany until to-day. The Slavic peoples, in the main, derived their alphabets from the Greek forms between the seventh and tenth centuries. So two quite different derivatives of the Greek alphabet were developed by adjacent peoples.

An interesting side-line in this diffusion was the invention of the Ogham script by the Celtic peoples in the third century. This is a wholly different kind of character, in no way directly derived from the alphabet in any of its

many forms, but suggested by it. In this peculiar form the characters are all straight lines, the vowels being indicated by a series of from one to five dots on the line, and consonants by one to five short lines standing out at an angle, either on the right or left of the main line. The Ogham script is thus a striking instance of marginal specialization in which the trait itself did not pass, but only served as a stimulus for the invention of a wholly new means of carrying out the original idea.

From the Aramaic, a form related to the Phœnician alphabet, there developed the typical quadratic Hebrew, with greater changes in form of the letters than took place throughout the whole development of the European branch. Thus here we have a case where, in the very home of the trait, the changes undergone were greater than those due to long diffusion and several changes of culture and environment. But the changes were local, they applied locally only, and the modifications developed at the trait nucleus did *not* diffuse from there toward the outlying areas. At first the new local form (Hebrew) had still no indication of the vowels, but in the sixth and seventh centuries A. D. these came to be supplied by the use of "points" or diacritical marks.

While the Hebrew was becoming more and more angular and box-like in the forms of its letters, another branch of the same Aramaic from which it had grown, was developing a more cursive, curvilinear type, which ultimately became known as the Syriac. In the fifth century A. D. this started to differentiate into two forms as a result of religious differences which at the time divided the Christian Church, the Nestorians in Persia using one form, while the western Syrians, who were under Roman rule, used the other. This well illustrates how a material trait may be strongly influenced by non-material factors in culture, as well as the way in which a trait may rapidly develop local forms. The

Nestorian form of the alphabet, which early developed "points" or vowel marks, served as the source for the Zend or Old Persian and the Kharosthi, a form used for a time in Turkestan and northern India. Carried by missionaries throughout inner Asia, it there developed the Old Turkish, the Mongol, and the Manchu forms. In each case changes and modifications took place which were often cumulative, culminating in the case of the Manchu, where, as a result of the influence of the Chinese custom of writing in vertical columns, the alphabet characters were turned through an angle of 90 degrees and written from top to bottom as appendages to a vertical line. Here, again, we have an extreme marginal specialization due to the influence of a neighboring culture pattern.

From the Nabatæan form of the Syriac, in use by the nomads of Sinai and northern Arabia, came in the second and third centuries A. D. Arabic, very cursive and with elaboration of special forms of characters according as they were initial, medial, or terminal. This is, in principle, allied to the development of capital letters in Europe, only the principle is carried out logically to its conclusion. With the spread of Islam, this form spread rapidly and widely, giving rise later to the modern Persian and modern Turkish. In these, and Persian in particular, the decorative element was very greatly stressed, so that calligraphy became really an art, and very elaborate and complicated forms of the characters were developed for purely ornamental purposes. Here we have again a partial parallel to the European decorative forms, such as the Gothic, only in Persian the ornamental factor was carried even further. From Persia the earlier forms of Arabic spread farther eastward to Afghanistan, India, and the Malay world; on the other hand, from Arabia itself the Arabic spread westward over portions of Africa.

Fully as early as the diffusion to the Greeks took place,

and apparently from the same source, the early Semitic alphabet made its way to India, where it underwent a drastic series of changes, developing there practically into a syllabary, since each consonant was regarded as having associated with it an "A" vowel. If it was to be understood as without the vowel sound, this was indicated by a special sign, the "virama." Here we have two interesting features, a reversion, as it were, from the true alphabet to the more primitive syllabary form, and the use of diacritical marks in a negative rather than positive sense. Many additional characters were also added to the series as received, compound consonant characters were invented, and the whole systematized in a very elaborate manner. It is easy to see that in India we have a far greater degree of modification and specialization taking place than anywhere in Europe, let us say, and not only this, but the rate of change was apparently very rapid, for the whole gamut was run in India before the later developments out of the Roman forms had taken place in Europe.

From this Brahmi, as the older Indian form was called, came a long list of other alphabets—Sanskrit, Tibetan, all the Dravidian alphabets of southern India, and Pali in Ceylon. From this latter with the spread of Buddhism came the Burmese, Cambodian, Siamese, Javanese, Sumatran, and all the Philippine forms, and finally Korean. Here, as in the neighboring Manchu alphabet already spoken of, the letters were written in vertical columns from top to bottom under the influence of the Chinese culture pattern. Thus in Korean and Manchu we have the meeting of two separate streams of diffusion, the one coming from Syria by way of India and Ceylon, the other also from Syria, but by way of Persia and Central Asia. Each at this ultimate point succumbed to the culture pattern of the Chinese—a pattern originating in the ancient custom of

writing on long strips of bamboo, which custom of vertical writing was then still retained after paper had come into use.

The last line of diffusion came from the southern Semitic forms of the alphabet. This gave rise to the ancient Sabæan and other southern Arabian forms, the Sabæan spreading in the beginning of the Christian era to Abyssinia, where it gave rise to the Ethiopic. Here a new type of specialization arose, in that a new means of indicating vowels was devised, various elements being added directly to the characters representing consonants.

This hasty outline of the diffusion of the alphabet reinforces at many points the conclusions drawn from the previous examples, and serves to bring out strikingly, features which the available data in other instances do not supply. It serves to emphasize again that the centre of origin for the trait (the eastern Mediterranean) is by no means central geographically in the total area over which it has diffused. It repeats the evidence already given by the other examples, that the centre of origin is not a source from which the later specializations flow. On the contrary, the areas of increasing specialization and development are mainly marginal, where the advancing trait meets new environments and new cultural types and patterns, to which it has to conform in order to be accepted. It shows that the widest changes, the most striking specializations take place as a rule at the very end of the diffusion stream; it affords, in detail, the most precise evidence of the cumulative character of the changes undergone in protracted diffusion, and shows that the marginal forms of the trait (Ogham, Manchu, Korean, Pali, Ethiopic) do not in any sense represent the primitive form.

It enables us to get in many cases definite historical data as to time, and shows that diffusion in one direction may

be very much more rapid than in another, as in the diffusion to India at the same time that it was just reaching Greece. It shows, further, that not only do all sorts of complex cross-currents of diffusion occur (as in the development of Armenian from Greek, rather than from the nearer Syriac), but that adjacent peoples may receive the same trait by very different ways, as in the instance of Korean and Manchu. It demonstrates the influence of purely physical features of environment in the changes in form of characters produced by the different media upon which and with which writing was done (inscription on stone or wax tablets, scratching on leaf, painting with brush, writing with pen, etc.). In short, there is hardly an aspect of the whole process of secondary diffusion which the diffusion and development of the alphabet does not exemplify, giving us, moreover, the opportunity to determine time relations, which few if any other traits supply.

A last example, which strikingly illustrates certain other features of secondary diffusion, is that of the spread of block-printing. Here, as in the last instance, we are fortunate in having definite historical data, which have recently been carefully collected and ably presented by Carter.¹

After a long period of nearly a thousand years, during which the elements that led to the invention of printing were slowly being co-ordinated to that end, the invention of block-printing took shape in China, probably early in the eighth century. In what portion of the country the invention was made is as yet not known, but by the end of the century it seems to have been pretty widely diffused. This would appear to be shown by the fact that in 770 A. D. knowledge of the art had already spread to Japan. But although introduced, the time was not yet ripe and, in spite

¹ Carter, T. F., "The Invention of Printing in China and its Spread Westward." New York, 1925.

of the fact that printed books were imported from China afterward, it is nearly four hundred years before there is any evidence of printing in Japan. This failure of the trait to establish itself is especially remarkable, since during the whole of this period of four centuries, Japan was actively and ardently adopting and incorporating Chinese culture, as a result of the commission sent early in the seventh century to China to study its civilization. Interrelations with China were close during the Tang dynasty, when printing on a colossal scale was going on in China, so that there was no lack of opportunity for the trait to diffuse. We have here then an excellent instance of the failure of diffusion, but the real reasons for the failure are not as yet apparent.

Westward, as a result probably of the active trade over the silk-ways to Samarcand, the trait spread more rapidly. It had reached western Kansu and advanced as far as Turfan in eastern Turkestan by the ninth century, and to the northwest was in use at least as early as the eleventh. At Turfan, which was a great cosmopolitan centre at this time, printing was carried on in six different languages. The city was the capital of the Uigur Turks for two centuries, and when they were later conquered by the Mongols in the early thirteenth century, the latter adopted much of the Uigur culture and carried it with them in their whirlwind campaigns against Europe.

That the knowledge of printing had not penetrated to Europe along the silk-ways during the centuries prior to the Mongol invasions was due to the impenetrable block of Islam. For, because of religious conservatism, the Moham-medans refused to print, the Koran having to be written as tradition required, and since the eighth century they had held all Asia as far east as Turkestan. Thus the conservatism of Islam served as an impassable barrier to the continued westward diffusion of printing, notwithstanding the

fact that during these same centuries it was Islam which brought to Europe many other traits of Chinese culture, such as the compass, gunpowder, paper, etc. Here, then, is an instance where the differential diffusion of different traits is well brought out, and printing was thus held back for centuries while other traits slipped through.

The Mongol contact with central Europe was brief, if intense, and little in the way of cultural influence seems to have occurred. Yet it is possible that during their brief raids into Germany, Austria, and to the shores of the Adriatic, that some suggestions of printing may have been left behind. It is probable that the Mongol armies were paid in paper money, which had been in extensive use in China for several hundred years. Pieces of this or of books belonging to the Mongol's Uigur secretaries and accountants may well have found their way thus to Europe. There is, however, no concrete evidence for the supposition, but it is curious that the earliest block-printing in Europe was precisely in the region near the limits of the Mongol raids, *i. e.*, Venice, Prague, and Bavaria.

The contact of the Mongols with eastern Europe was much more intense. It endured in one way or another for nearly two hundred years, and Chinese paper money, at least, can hardly have failed to be known. The Papal emissaries to the Mongol court in the thirteenth century, the missionaries sent there at the end of that century and the beginning of the fourteenth, and the merchants and travelers who visited China at this time, could not help but know and might even have been familiar with printing in China and, in the case of missionaries, may actually have used it there. Through them, therefore, a knowledge of the trait must have percolated to Europe, although we have no concrete evidence of this. Yet it is noticeable that the first printing in Europe took place within fifty years after the missionaries were sent.

Another point of contact with the printing art lay in Persia, where at Tabriz, after the Mongol conquest in 1221, the Mongols were in close association with Europeans, and especially with both Genoa and Venice, each of which cities had resident consuls at Tabriz in the fourteenth century. Actual printing was, moreover, carried on at Tabriz for a time. Further, the history of Rashid-ed-Din was written in Tabriz at this period, and in this work which was widely read in the fourteenth century, he gives a clear description of the process and its varied uses in China.

Printing had, however, got even closer than this to Europe, for from finds in the Fayum, it seems clear that the art had been secretly practised there since the tenth century, *i. e.*, before it had been well established even in central Asia! Here, then, is an instance where a wholly unexplained and enormous leap was made by the trait, yet with no appreciable result.

Playing-cards afforded still another source from which Europe may have acquired the printing art. Developed as some believe in China from paper dice with pictorial additions, perhaps as early as the tenth century, they were widespread there by the beginning of the twelfth and were doubtless used and carried to Europe by the Mongols at the time of their invasion. In Europe the earliest certain reference to playing-cards dates from the latter part of the fourteenth century. The earliest use of printing in Europe, other than for playing-cards, was for religious prints, the first form also in which the art was used in China in the eighth century. The earliest dated prints in Europe are in 1423, after which their use rapidly increased, and later with added text, they were folded and bound as books. Thus block-printing, invented in China in the eighth century, carried to a high peak of efficiency and production as early as the tenth, did not reach Europe and become adopted there for nearly seven hundred years.

But here a further point of great significance for our purpose comes in. Printing could not have been adopted in Europe until the people there were in possession of a material on which to print. And, although paper had been in use in China since the second century at least, paper-making, as an art, had not diffused to Europe until the middle or end of the twelfth century, and was not made in Germany until a century or more later. It is true that paper had been imported into Europe from Bagdad and Damascus since the end of the eighth century, when factories, using imported Chinese labor, had been started by Haroun-al-Rashid. Later its manufacture spread to Egypt and Morocco and went with the Saracens to Spain. But it was not until the fourteenth century that it became abundant enough to be available as a material on which one could afford to print. Parchment, previously in use for hand-written manuscripts, was unsuitable for this use. As Carter says "the coming of paper made printing possible, but it was printing that made the use of paper general."

The spread of paper-making in Europe is instructive also. For its diffusion was much slower than in China or the Asiatic world. The reason for this seems to lie in the fact that parchment was harder to displace than the far inferior bamboo strips, silk, or papyrus, *i. e.*, the new trait had to compete in Europe with a stronger foe.

The whole history, here briefly outlined, of the diffusion of printing and of paper-making, illustrates strikingly the long failure of diffusion in the face of adverse conditions. In Japan, for reasons not yet clear, the trait failed of adoption for four hundred years in spite of close cultural relations between China and Japan. In Europe it had to wait until another trait, also of Chinese origin, had been accepted, and above all for that awakening of the spirit in the Renaissance which supplied the need that only the art of printing could fulfil.

The examples given of the process of continuous secondary diffusion suffice to demonstrate, among other things, these fundamental facts: (1) that from the culture areas in which a trait arises, it diffuses asymmetrically and erratically, and at varying rates; (2) that in its passage to new environments and new cultures it is often modified and specialized as a result of their influence; (3) that the area of origin, the trait nucleus, is not usually the centre whence specializations spread, but that these arise in the main marginally; and (4) that parallel development at different points, or convergent evolution, is a not uncommon result. The theory, therefore, of concentric zoned diffusion, with specialization proceeding only at the trait nucleus, which has been put forward by Doctor Wissler, and which with significant reservations we found to apply in the case of primary diffusion, does not here hold good. Why should the principle be valid in the one case and invalid in the other? Does not its validity or partial validity within the culture area render it difficult to deny its worth in the larger field? The answer to these questions lies, I believe, in the one word environment, taking this in its widest meaning to include both physical and cultural factors. The theory holds good, as far as it does within the single culture area, because throughout it the trait is subject to substantially the same physical conditions, and to analogous if not identical culture patterns. Yet even there, as we have seen, it only partially holds true. Just so soon, however, as in the course of secondary diffusion the trait passes into another environment and a different culture, the enormous and persistent power of modification which both exert, comes into play, to the ultimate and inevitable ruin of the principles hitherto active.

In the examples which we have discussed there has been evidenced a considerable difference in the limits to which secondary diffusion has extended; the blow-gun diffused

over considerable portions of two continents, the moccasin encircled the northern portions of both hemispheres, the alphabet has to-day reached practically every portion of the world. Obviously the limits of diffusion vary with different traits, since, for some, environmental requirements may set bounds they cannot pass. Thus rice culture obviously cannot diffuse into areas where the climate is such that rice cannot be grown. Yet sometimes a trait may spread beyond a barrier, limiting its full or efficient use, degenerating ultimately into a mere toy. This is shown, for example, in the case of the blow-gun, where among the Aztec and Iroquois it ceased to be a weapon of any importance. Beyond the Iroquois it could not even go as a toy, for farther north the reeds from which the implement was made did not grow. The barriers may be physical or cultural and sooner or later most material traits succumb. Non-material traits, however, or those which rest on universal rather than local opportunities, may diffuse, if conditions are favorable, without limit.

Reference was made earlier to the fact that a trait which, either by invention or as a result of diffusion, had become part of the culture of a people was not only not immutable but also not immortal; that it was not only subject to modification but to decay and ultimate disappearance. Much has been written of "lost arts," and many fanciful claims for an ancient and forgotten knowledge have been put forward by ignorant or overimaginative writers. Quite apart, however, from such fantastic claims, the degeneration and final loss of cultural traits is a well-authenticated and not very infrequent fact.

Degeneration may occur as a result of various causes, such as a rise in cultural level so that the value of the trait becomes greatly reduced, or it is replaced by an improved form either locally invented or brought in by diffusion. Or

again, a change in environment due to migration may render the former trait no longer useful, or may in some cases so depress the general level of culture that the trait in question suffers degeneration with all the rest. Often, however, the causes which lie behind degeneration are very obscure. So, for example, in the case of the disappearance of the bow as a weapon among the Polynesians, it is hard to account satisfactorily for the phenomenon and none of the explanations suggested by various writers seem adequate.

A trait may, however, not merely degenerate as in the case of the bow in Polynesia, where it still survived as a toy; it may be completely lost. A striking instance of such a total loss of a trait is supplied by Polynesia again, where pottery-making had totally disappeared. There is no evidence anywhere in Polynesia that pottery was ever made, yet the ancestors of the Polynesian people in their earlier Indonesian home probably were in possession of the art and one can see no adequate reason why the manufacture of this useful product should have been given up. But lost the art certainly was, and so thoroughly that not even a tradition of it now remains. Although, however, a trait may be, and often has been, lost, it must be remembered that the loss is for a specific people and not, except for the rarest cases, for mankind as a whole. For diffusion saves the loss from becoming absolute. By its aid the trait which people *A* may lose has already been communicated to *B*, among whom, if it be of value, it will probably survive and pass on to wider spheres of use and betterment. Only in the rare coincidence of a newly invented trait and a devastating cultural or environmental cataclysm, would a complete loss be likely to ensue.

A trait, then, in its diffusion may die out and become lost among some particular group or groups, while surviving among others, so that starting, let us say, in *A* it survives

in *B*, is lost in the course of time by *C* and *D*, but not before it had diffused still further to *E*. The result of the loss is thus a discontinuous distribution for the trait, there being a gap in which the trait is absent. If now we knew nothing of the history of the trait, and were unaware that it had originally diffused continuously from *A* to *E*, we might believe the situation was to be explained in one of two ways: we might think the isolated existence of the trait in *E* was due to discontinuous diffusion, or was the result of independent invention.

It is easy to see, therefore, that in the study of diffusion and of the growth of culture as a whole, we cannot lightly and merely note the present distribution of a trait and draw valid conclusions from this fact alone. It is essential to discover, if possible, the past history of the trait and to determine whether a gap, be it wide or narrow, in which the trait does not now occur, has ever been filled by it. In a great many instances, unfortunately, the data necessary to establish this fact are lacking, and we must, perforce, resort to such other contributory evidence as we can find. In a later chapter, dealing with precisely such difficult cases, we shall have occasion to go into the problem more at length; here it is mentioned in order to serve as a transition to our next subject, that of discontinuous diffusion, which is one of the alternatives involved.

In our consideration of the phenomenon of diffusion up to this point, we have assumed the spread of a trait to be such that it passes from group to group continuously. But a trait may, and often does, leap over an adjacent area, so that its spread becomes discontinuous. Such a phenomenon may be brought about in various ways. A possible, but uncommon method is as the result of rapid migration, in which a group travels across a broad area to a new and distant home, so quickly as to give little or no opportunity

for the traits of its culture to be absorbed by the peoples through which it passes. Such migrations are likely to be those of fugitives fleeing from a conqueror or from conditions of life which for one reason or another have become intolerable. Such a movement brings a group suddenly into a new area, carrying cultural traits foreign to the environment and culture of its occupants. Some of these traits may not only survive among the immigrants themselves, but also be adopted by the folk among whom they have settled, and begin a new career of diffusion from this new centre.

Conquest, again, may lead to the imposition or introduction of the conqueror's culture. Where the conquest is by land the intervening country must usually receive the influence as well, but where a maritime conquest occurs, a true discontinuous diffusion may result. Thus while trader and missionary may have preceded actual conquest, yet the introduction of Indian culture into Burma, Indo-China, and Java was in considerable measure the result of the establishment of conquering Indian dynasties. The outstanding instance, however, of such discontinuous diffusion is that of the conquest of the New World by Europeans, with the destruction of the old culture and the imposition of the new.

A second fashion in which cultural traits may leap over an area, and thus leave a gap, is in the course of trade, especially that which is sea-borne. By land the trader is a distributor and diffuser of traits as a rule continuously all along his route, and a vehicle thus for normal continuous diffusion. By sea, however, he may pass by a long stretch of coast, dangerous or inhospitable because of physical conditions or on account of the character of its inhabitants. Or among peoples who are no longer confined to coastwise navigation, the trader may set out across broad bays or gulfs, or even cross whole seas. The trader carries with

him, of course, much besides his wares, and may serve to diffuse not only products but customs and ideas as well. So, in the New World, it seems probable that the knowledge of bronze reached Mexico from the Peruvian coast, by traders who came northward from there, but who did not diffuse the trait among any of the intermediate peoples.

A third way in which cultural traits may reach a distant area at a bound, is by means of missionary effort. Here the primary reason for the contact lies not in material gain, but in spiritual zeal, and although his object be to spread his faith, the missionary like the trader, carries with him much else besides. The methods of the missionary may be peaceful as in Christianity or Buddhism, or warlike as in Islam, and although the missionary spirit is, in general, weak or lacking among most aboriginal peoples, examples of its presence are not unknown. As an instance one may cite the so-called Ghost Dance religion which originated among the Indian tribes in eastern Oregon, and was spread quite widely among the Indians of the Plains in considerable part by missionary activity.

Again, but only rarely, we may have traits belonging to a distant culture adopted voluntarily as a result of the conviction that they are valuable or superior to one's own. The outstanding example of this form of culture transference is Japan. Twice in the course of her history the Japanese people have premeditatedly adopted exotic culture traits wholesale. First in the seventh century when they sent a commission to China to study its culture, and on whose return after years of investigation, they reorganized their own government and culture on an extensive scale, in accordance more or less with Chinese models, adapted to meet their needs. Again in the nineteenth century a little group, convinced that European culture had much to offer, went to Europe and brought back to the hermit people the

elements of modern Euramerican culture, which in the last fifty years the Japanese have so largely absorbed.

Lastly, we have the vagaries of pure chance, particularly in areas where seafaring peoples live, in that storms may drive folk far out of their course and bring them to shore at some distant point. Such storm drifts have been frequent in the Pacific region and are believed to be responsible for various trait transferences there.

In principle, discontinuous diffusion, however it may be brought about, is analogous to continuous diffusion across an abrupt environmental or cultural barrier. For in each case, the trait or traits must pass suddenly from one culture and environment to the other, and essentially the same factors are thus involved. But in addition there are others, which, if they appear in the case of diffusion to a contiguous culture and environment, do so in different degree. Obviously, the differences in cultural development may be greater in the case of a maritime contact of the sort suggested than is likely to be the case between any two contiguous people. For even where the contrasts between neighbors are at their extreme, there is always some transitional group, always a belt, even although narrow, where elements of both cultures merge. Between the Indian or Chinese trader of the fifth century and the aboriginal peoples of Borneo, for example, there was no such transition; the impact of the cultures was sharp with nothing to soften the blow.

When the discontinuous contacts are between folk of widely differing culture the chances of diffusion would therefore tend to be less since the disparity is too sharp. Diffusion takes place under such circumstances it is true, but in general it seems probable that the hazard is greater than when the diffusion is continuous. After all, in the case just referred to, very little of Indian or Chinese culture did ac-

tually diffuse to the people in Borneo or the western Philippines, where no actual conquests or colonization as in Java took place. What at least seems certain is, that in such discontinuous diffusion, prediction of the result is much more difficult and dangerous than in other instances, and because in one case such contacts led to the adoption of certain traits, we cannot safely argue that they must have done so in others.

Another feature of importance in diffusion of this discontinuous type is that of the intensity and frequency of the contacts established, and of the number of the traders, missionaries, conquerors, or fugitives, storm-driven mariners, or adventurers involved. A single brief contact may be wholly devoid of traceable results, and only in exceptional cases can we suppose that diffusion of any consequence would occur. Repeated or frequent contacts, on the other hand, offer increasing opportunity for the transference of traits. Yet even in such cases, little or nothing tangible may result. The brief contact of the Norse with the tribes of the Gulf of St. Lawrence region or farther south had no observable effects, nor did the contacts doubtless made by the Portuguese and Breton fishermen during the early sixteenth century in the same region, leave definite traces among the Indians. The Scandinavian colonists in Greenland were in touch with the Eskimo off and on for several hundred years, but the latter took very little in the way of cultural traits from them. On the other hand the partly discontinuous diffusion of western Asiatic, and particularly Persian traits to China and of Chinese traits to western Asia and Europe along the desert caravan routes was considerable. Yet the Carthaginian trade with the West African coast, which appears to have gone on for some time, left no noticeable traits among the Negro peoples of the area.

The question of the numbers involved in such contacts has a distinct bearing on the whole matter. Where emigrants or traders come in groups of some size, they can by their numbers and the general superiority of their weapons prevent the consequences of warlike attack, where a handful of strangers might be overwhelmed and destroyed in spite of the advantage given by better weapons. It must be remembered that as a rule among people in the lower stages of culture, a stranger is always a potential enemy, so that a few persons coming, let us say, by sea and attempting to land, would run great risk of being received in any but a peaceful manner, and would have, if their hosts were a numerous and warlike people, little chance of survival. It must also be remembered that in weapons, we are dealing not with the enormous superiority which firearms have in the last few centuries supplied to the peoples of higher culture in their dealings with savage or barbarous folk, but with the relatively small, although of course very definite, superiority of metal over wood and stone, or of iron over bronze.

This only too obvious fact, of the precariousness of attempts at trade or settlement among a barbarous folk on the part of small groups of people of even much superior culture, is not merely disregarded but flatly denied in some of the recent theories of the world-wide diffusion of particular cultures. As we shall discuss in a later chapter these somewhat naïve theories, there is no need to go into the matter further here, except to point out that although the destruction of such small groups is far from inevitable, the chances of its being frequently the case are too large to permit acceptance of theories which require small bands of traders or colonists to wander unscathed across the world.

We have thus far in our study of the phenomenon of diffusion, confined ourselves mainly to the problem of the in-

dividual trait. It may be remembered that in the introduction it was noted that traits are often combined into what are known as trait-complexes. For example, the use of a bridle and bit is a single cultural trait, so is the use of a quirt, a saddle, or of stirrups, or horseshoes, or harness, or wheeled vehicles. Yet all of these single traits are associated with another trait—the domesticated horse—and all together form a complex of related traits, which may be called the horse-complex. Although the general principles which apply to single traits apply here also, there are some very important differences to be observed, the consequences of which are of fundamental significance for the study of the growth of culture. We must then examine the trait-complex and see what these differences are.

CHAPTER V

THE TRAIT-COMPLEX

As has just been pointed out at the end of the last chapter, individual culture traits are often associated more or less intimately together in trait-complexes. Such complexes, as soon as we investigate them even hastily, are seen to fall into two contrasted types, which may be called the logical and the accidental. The former is one similar to the example given of the horse-complex, in which the several associated traits all have some logical connection, either with each other or with one trait which dominates and binds together the whole. In the example just referred to, the horse is clearly this dominant trait, and the bit and bridle, the saddle and quirt have each and all their *raison d'être* in the horse. Without the horse, or some substitute for it, they are nearly all useless and meaningless. The wheeled vehicle, it is true, can be drawn by human arms, as in the jinrikisha of Japan, but the other traits lose their significance apart from the horse or a substitute. Other examples of such logical trait-complexes are to be found in large numbers in the field of material culture especially, such as the spinning-weaving complex, or the canoe-paddle-sail complex, or in other fields the semi-logical type of the age-group or totemic complex, etc.

The accidental trait-complex on the other hand lacks in large measure or even entirely, any such logical basis of association for the traits of which it is composed. The association itself is dependent on the accident of history, to the fact that at some particular time and place certain traits

were coexistent in the culture of a people, and formed so essential a part of that culture that, for reasons often obscure, they tended to adhere more or less strongly to form a complex. In the New World, the practice of agriculture and the art of pottery-making form a pair of traits of this sort, which is often referred to. Or, to take a modern example, one might speak of a telephone-automobile-electric-light-moving-picture-radio-complex as characteristic of American culture of to-day, and as likely to be carried by Americans wherever they might go. Unlike the logical complex, the accidental type is not marked by the presence of any particularly dominant trait. One may be more important than another, but its disappearance would not necessarily interfere with the persistence of the rest.

There is also a further distinction between the two types of complexes in that whereas the logical complex, because of necessary association between its constituent parts, is essentially permanent, the accidental type may be relatively ephemeral, since with development in culture a trait which at one time formed part of the group may be replaced by a new one. In the case of the horse-complex, for example, as long as horses are used for riding or driving there will be some form of bridle, saddle, harness, or cart. These may change in model, or be greatly improved in detail, but in some form or other are bound to survive. On the other hand, in the modern American instance suggested, if we go back for fifty years, we should lose from the complex all its traits and would have to replace them, let us say, by the telegraph, railroad, gaslight, and other traits. This is of course an extreme case, due to the marvellously rapid advances and changes in culture in the last few generations. In the earlier stages of European civilization or among savage and barbarous peoples, the elimination and substitution would be vastly slower and much less radical.

It is clear that there may be wide differences between any two such accidental trait-complexes in the tenacity with which the individual traits adhere. In one case the adhesion may be slight and the group easily liable to disruption, in another the traits may be so firmly welded together by historical circumstances, that they will continue to hold together in the face of powerful disruptive forces.

Now a trait-complex diffuses in the same way that an individual trait does, except that the two types may be differently affected by the process. For in the case of the logical complex, the inherent relationship and interdependence between the several traits tend, as has been said, to hold them together in diffusion as it does in time. The extent to which this occurs is dependent on the strength of the logical bond. This may be seen in the instance of the diffusion of the horse-complex. Originally evolved, probably, in inner Asia, this complex seems to have comprised besides the dominant trait of the horse, the bridle and bit, the saddle, the quirt, the harness, the cart, and the use of mare's-milk for food. The stirrup was probably a later addition; at any rate it first appears as a single ring on one side, and only later on both. The horseshoe was also a later trait, added in Europe. The whole complex diffused to Europe, but lost the mare's-milk trait on the way. Later, the Spanish took the complex with them to the New World, except that the harness and cart had in their usage been transferred in large measure to oxen or other draught animals. When, then, the complex was taken over by the Indians of the Plains in the sixteenth century, they took the bridle, saddle, and quirt which were really basic traits, discarding the horseshoe, partly because they had no iron or skill in metallurgy and partly because, as in the central Asiatic steppes, there was little need for a shoe on the grassy surface of the Plains.

In logical trait-complexes the dominant trait is the carrier, as it were, of the rest; if it diffuses, the others follow as a matter of course. Only rarely does a subordinate trait in the complex break away from the group and spread independently by itself. An example of such spread is seen in the probable diffusion of the saddle, from the Mongol-Turk peoples to the reindeer-using Tungus tribes who adjoined them on the north in an area for which the horse itself was not adapted. Here the subordinate trait was transferred to a different animal, used for a similar purpose, and so entered into the formation of the reindeer-complex of northern Asia.

With lessening coherence of the component traits, or failing dominance of the carrying trait, the individual traits gain in their power of independent diffusion, and one may find all stages between the true logical complex with a strong bond and clear-cut leader, and the most casual and ephemeral of accidental forms.

The individual trait, as we have already seen, is subject in the process of diffusion to modification as a result of changed environment, the influence of other culture patterns, etc. The question arises naturally whether a complex is more or less liable to the same sort of change. Theoretically, so far as the logical type is concerned, there would seem to be something to be said on both sides. The complex, consisting as it does of several traits, might be thought, because of what may be called its greater surface, to be more easily affected by environment or cultural changes, since there would be more points at which it was vulnerable. On the other hand, it might be argued that "in union there is strength," and that just because the complex comprised several traits, it would be stronger or perhaps more flexible and adaptable and so, either way, less liable to change than the single trait.

If we turn to concrete examples to see which of these opposed theoretical views best fits the facts, it appears that in the majority of cases most readily occurring to one, they confirm the latter rather than the former conclusion. To recur again to the horse-complex. It has diffused very widely all over the world, into all kinds of environments and cultures, yet the core of the complex—horse, bridle, saddle, quirt—has practically everywhere survived intact. Local conditions have led to modification or loss of some of the other originally associated traits, or to the addition of new ones (such as the horseshoe) but the essential traits have held together. The same might be illustrated by numerous other examples in the field of material culture. In non-material complexes, the evidence is less clear, for in instances like Buddhism or Christianity the changes consequent on diffusion have been very considerable. While, therefore, we should probably not be justified in saying that logical complexes are always more resistant than individual traits, it seems to be within the truth if we regard them as at least as resistant, and sometimes as more so.

If now we turn to the other type of trait-complex, the accidental, a different condition of affairs is at once apparent. Here the essentially accidental association of the component traits is merely a historical fact, it is not based on any structural or inherent relation, and there is no definite primacy for any one trait. It has already been pointed out that accidental trait-complexes are often quite ephemeral even among the groups where they originated, and are often subject to far-reaching changes and substitutions. The same phenomenon takes place in the course of diffusion, for the loosely bound aggregate is easily vulnerable. We might thus theoretically expect a complex of the accidental type to disintegrate as a result of diffusion, first one then another of the traits being sifted out as a result of changing

environments and culture patterns encountered. So that if such a complex were to diffuse far enough and long enough, it would be so winnowed out that perhaps but a single trait of all the original group might survive at the end.

It might be contended on the other hand that historical circumstances may, as already suggested, so weld the component traits that they will be able to withstand the effects of environmental and cultural change. Such a firmly knit complex is indeed possible, but would be formed only in exceptional circumstances and can certainly not be regarded as a normal case. But let us turn to some concrete instances to see what actually does happen and waste no more time in speculation as to what might occur.

We may take first a simple case of two traits, the agriculture-pottery complex of the New World.¹ The assumption here is that maize-agriculture and pottery-making both arose, although not necessarily at the same time, in the same area, *i. e.*, middle America. Here for a long period they formed a fundamental part of the local cultures, and when these began to diffuse, the two traits, adherent through long association, always travelled together, so that where one went the other went also. As we have no historical data on the actual facts of this diffusion, the assumption can be neither proved nor disproved directly. But archæological evidence on the one hand, and the facts of geographical distribution on the other, both are unanimous, it seems to me, in indicating that the assumed complex either did not exist or, if it did, that it broke down time and again, sometimes one of the pair of traits diffusing ahead, sometimes the other.

To take the archæological evidence first, the Basket-maker caves in northeastern Arizona and adjacent territory

¹ Spinden, H. J., "The Origin and Distribution of Agriculture in America." *Nineteenth Congress of Americanists*, Washington, 1917, pp. 269-276.

supply us with evidence that these earliest known peoples in the Southwest had corn, but no pottery. The corn was of but a single variety, yet seems to have been in relatively abundant use. Later, among the Post Basket-makers pottery appears, and subsequently reached a high stage of development and elaboration. It seems clear, therefore, that in the Southwest agriculture made its appearance, diffusing from the southward, well ahead of pottery, if indeed the latter was a diffused trait after all. For there is a growing possibility that pottery here may have been an independent invention. This possibility rests on the fact that numerous examples have been found, at very early sites, of pots moulded in baskets, by lining the latter with clay and then, after drying, removing it from the basket. This method of making unfired pottery is one that has often been suggested as likely to have been the way in which pottery was invented, so the fact of vessels of this type occurring in the Southwest at the very beginning of the pottery-making period, certainly offers the possibility that the trait was independently invented here.¹ This, of course, does not mean that later influences affecting pottery did not reach the area.

From the Southwest, cultural diffusion westward to southern California took place. But in this case the reverse phenomenon seems to have taken place, since agriculture lagged behind pottery, which in crude form extended some distance farther northward than we have any evidence for the use of agriculture. Farther north, the same phenomenon seems again to have occurred, since in prehistoric mounds in Manitoba crude pottery is found in considerable quantity, but no trace of the use of maize.

If we turn to the historic distribution of the two traits

¹ Morris, E. H., "The Beginning of Pottery-Making in the San Juan Area; Unfired Prototypes and the Wares of the Earliest Ceramic Period." *Anth. Papers*, Amer. Mus. Nat. Hist., vol. 28, pt. 2.

in North America we find that clearly a differential diffusion of the two has occurred. Practically all along the western and northern margin of agriculture, pottery fails to stop where agriculture ceases, but goes on a varying distance ahead. Thus the northern Shoshonean tribes of Idaho, western Wyoming, and Montana had pottery but no agriculture, and the same was true of some of the Algonkian tribes between Lake Superior and Hudson Bay. The Plains Ojibwa had both pottery and agriculture, but living Indians claim to remember the first introduction of the latter. A similar situation would seem to have existed in the northeast, where in the Maritime Provinces the Micmacs are said by all the older authorities to have had pottery, and abundant remains of it are found in the shell-heaps there; yet any use of agriculture among them was explicitly denied. It is true that Cartier reported seeing old corn-fields in Prince Edward Island and New Brunswick, but his statement is contradicted by the other sources. At any rate it is clear that at a number of points where the environmental conditions prevented the further northward spread of maize, pottery spread a considerable distance farther. A similar state of affairs is shown in the southern continent, where maize agriculture ceased in the region of the northern pampas, whereas pottery-making extended south into Patagonia. Also in the central portions of the Amazon forest area, although pottery was widely made, maize was not in use. Thus even where the trait-complex consists of only two traits, environmental factors generally succeeded in disintegrating the union along the margin of its diffusion area.

If we turn to an example comprising a larger number of traits and thus more resembling the type of complex assumed by the modern diffusionist schools, the evidence for disintegration is far more striking. Let us take for this

purpose the series of basic traits which characterized Chinese culture, forming a clearly marked accidental trait-complex, that in China itself persisted with relatively little change for well over a thousand years. Chinese culture diffused in various directions, how did it fare? To Korea, which had been in touch with China at least since the beginning of the Christian era, the larger portion of the trait-complex passed with relatively little change. The elaborate administration system, the strongly paternal family with its highly developed ancestral worship, the system of literary education and the educational basis for public office, the method of writing, the use of block-printing, the calendar, Confucian ethics, the so-called state religion, Buddhism, and a host of minor features of material culture, were all incorporated in Korean culture, although not all at once. Thus while Buddhism reached Korea in the fourth century, and the use of the Chinese written character was also early, the administrative system, calendar, educational system, etc., were not taken over until the fourteenth century.

Japan, although it received its earliest certain influences through Korea, received its main cultural loans from China direct in the seventh century, as the result of a commission sent thither to study and report on its culture. The elaborately centralized system of government was adopted in modified form, but the patriarchal family and ancestral worship was accepted only partially and considerably changed. Literary education and the literary basis for public office were not adopted at all. Chinese written characters were accepted only in that a selection of the simpler ones were taken to form a true syllabary, while printing, although ultimately adopted, was long delayed. The calendar was accepted, and something of Confucian ethics, but the elaborate ceremonies of the Chinese state religion were rejected. Buddhism, which had already been received

through Korea, was greatly strengthened. Thus, out of a total of eleven traits which Korea received, six, or more than half, either wholly failed to diffuse to Japan, or did so only in very imperfect or much modified form.

To the west and northwest, the Mongol-Turkish tribes were China's immediate neighbors; but to them little more than the use of block-printing spread. Even Buddhism, long established in China, did not ultimately reach them from there, but from Tibet. Their whole culture pattern differed so widely from that of the Chinese, that few of the basic traits of Chinese culture were adaptable to it. Some elements of material culture they did acquire, but the really basic traits did not diffuse. To the south among the Annamese, considerably more of Chinese culture penetrated, due in large measure to conquest and political control, but even here, some of the traits mentioned failed to find lodgement, and the modifications that marked those that did, were of a different sort than those occurring in Korea or Japan. Beyond Annam the typical Chinese trait-complex hardly passed, since here in Cambodia it had to contend, in part, with the trait-complex from India which had been firmly seated there for centuries. The same holds true for Chinese Turkestan, for here although conquered by China in the early years of the Christian era and held as a dependency off and on afterward, little of the Chinese trait-complex was absorbed. Block-printing was accepted, but the competition of the Indian and western Asiatic trait-complexes was too strong for other Chinese elements to gain much foothold.

Here, then, is a concrete instance (merely one of many which might be given) where even although we are dealing with a trait-complex as strongly knit and as enduring as that of Chinese culture, it goes to pieces almost entirely in some directions in attempting to diffuse even into a neighboring

group. And when it does diffuse, it loses components the farther we go, and practically fades away entirely at the second remove. The trait-complex of the accidental type is unquestionably unstable and, under diffusion, disintegrates with considerable rapidity. Even where, as in Japan, a considerable number of the component traits did succeed in passing into Japanese culture, they were not all permanent. For in Japan the centralized administration gave way in a few hundred years to a feudal organization, culminating in the Shogunate, and even Buddhism has had to give ground in favor of a renaissance of the old Japanese religion of Shinto.

So far as secondary diffusion, then, is concerned, the conclusion seems clear. Trait-complexes of the logical type are often very firmly knit, and may endure a diffusion which is practically world-wide without losing the really basic component traits. Complexes, however, of the accidental type are usually relatively fragile and, except under very unusual circumstances, disintegrate rapidly as diffusion proceeds. The larger the number of traits bound together in an accidental complex the more fragile it is, and the sharper the contrasts in culture pattern which the complex has to meet, the more rapid is its disintegration.

How about the primary diffusion of trait-complexes, however? Are they like individual traits in the character of their spread, and do the two types of complex differ here also? Unfortunately we cannot do much in the way of studying the primary diffusion of complexes of the logical type within the area of their origin. For most such complexes had already diffused far beyond these limits at the earliest time to which we can go back. We can, however, get data on the diffusion of complexes which are partly logical and partly accidental, complexes of the type of religious ceremonials or forms of social organization. Let us turn to one or two examples.

An excellent illustration is afforded by the diffusion of the religious ceremony known as the sun-dance, widely in use formerly among the Indians of the Plains. The data for the study of the process has been collected and discussed with great ability by Doctor Spier¹ and this material has served as the basis for a discussion of the history of its diffusion by Doctor Wissler² in his recent volume. It will be sufficient for our purpose to note in regard to the ceremony itself, that (1) it is probably the most important ceremony of the Plains tribes; (2) it is an annual ceremony lasting over several days; (3) it is essentially a tribal ceremony to which the whole tribe usually comes; (4) it may be analyzed into a large number of separate individual traits, comprising details of dress, actions, organization, etc.; (5) some of these are recognized as fundamental to the ceremony, whereas others are secondary; (6) some of the component traits appear in the same or slightly modified form in other ceremonies not only in the Plains but outside them; and (7) although the ceremony is typical of the Plains tribes, there are some who lack it entirely.

We may begin by noting the total distribution of the ceremony, as shown in Figure 21. This is based on the later historic locations of the various tribes in the early nineteenth century. If we attempt to reconstruct, roughly, the positions of the tribes about the beginning of the eighteenth century, however, when aboriginal conditions were still unchanged, we find a considerable reduction in area, so that the expansion of the area in which the dance was known, *i. e.*, the spread of the ceremony, was due in part, at least, to actual migration rather than normal continuous diffusion.

If, now, we analyze the sun-dance into its component

¹ Spier, L., "The Sun Dance of the Plains Indians: Its Development and Diffusion." *Anthrop. Papers*, Amer. Mus. Nat. Hist., vol. 16, pt. 7.

² *Op. cit.*, p. 88 *seq.*

individual traits, we find that there are some eighty-odd which are clearly distinguishable. The distribution of these several traits, which together make up the complex, is, how-

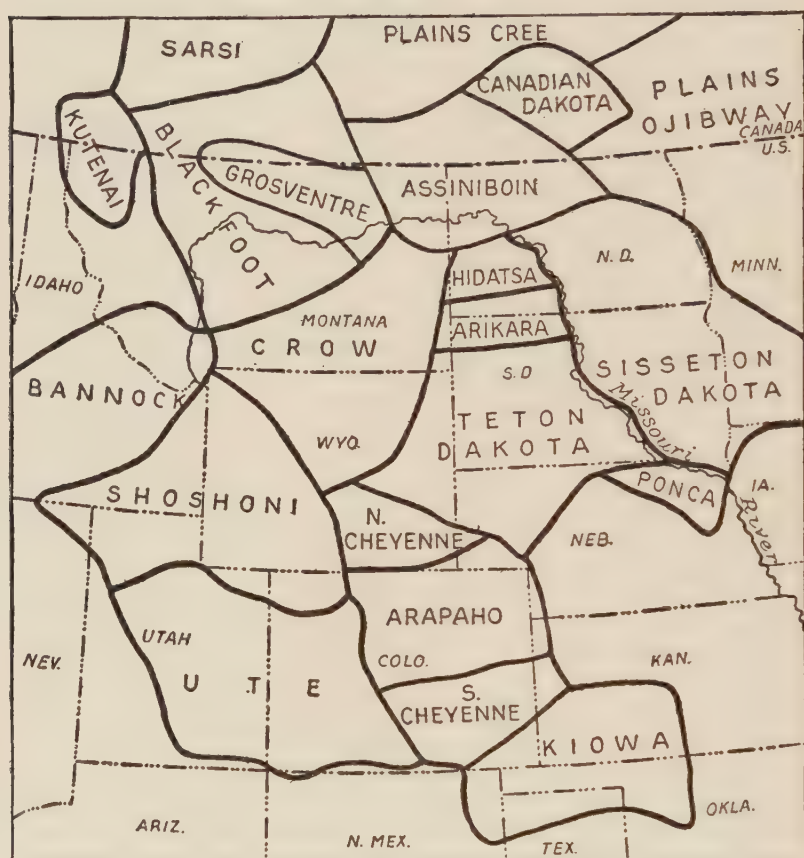


Figure 21.

Distribution of tribes having the sun-dance.

(The areas shown are only approximate.)

ever, very unequal, for in the ceremony as known to some tribes a much larger number are present than in others. The Arapaho tribe has the largest number of traits (fifty-four) possessed by any single tribe, and the number pro-

gressively decreases as we move toward the borders of the Plains region, until it drops among the Southern Ute to thirteen and among the Canadian Dakota to five. The ac-

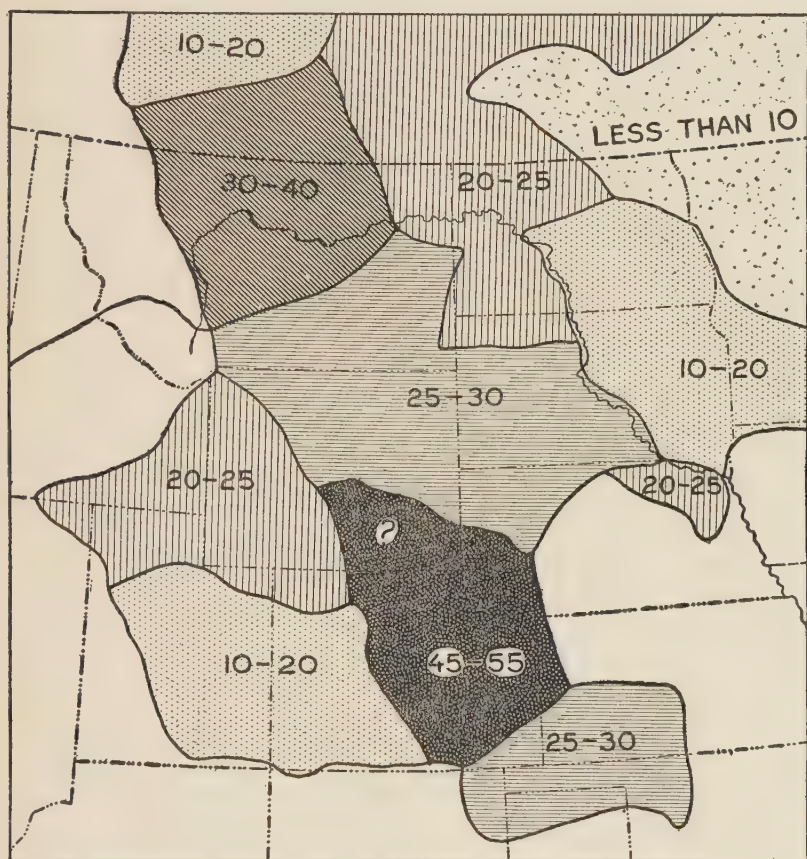


Figure 22.

Tribal distribution of sun-dance traits.

tual distribution of the number of traits by tribes, is shown in Figure 22.¹ It will be observed that this shows an irregular belt running from north to south, in which all tribes

¹For the Kutenai and Bannock no data are available as to the number of traits possessed.

have roughly half or more than half of the total number of traits known to any one tribe (fifty-four). This is bordered on the east and west by irregular marginal areas in which only a smaller number of traits are known. Within the belt the tribes having the largest number of traits (Arapaho and Southern Cheyenne) occupy an area near its southern extremity, and the tribes with the next largest number (Blackfoot and Grosventres) were settled at the opposite or northern end.¹ The areas of greatest elaboration, *i. e.*, those possessing the larger number of traits, are thus in the main *marginal*. The whole distribution is obviously quite asymmetrical.

As stated above, these traits may be divided into primary or fundamental traits and those which are secondary in importance. If we note, now, the distribution of fourteen primary traits only (as given by Spier), we get the distribution shown in Figure 23. It will be observed that this shows a single nuclear area, represented by the Grosventres, located to the north of the central portion of the whole area, with a second area comprising the Arapaho, which has but one less trait, opposed to it on the south. The central portion of the area is occupied by tribes having fewer traits, and, toward the margins, the number decreases irregularly and sometimes abruptly. The irregularity of the distribution is marked, for we find the Ute with but four traits adjoining the Arapaho with twelve; the Arikara, also with four traits, adjoining the Crow with nine and the Teton Dakota with eight; and the Canadian Dakota, with only a single trait, adjacent to the Plains Cree with nine. Distance from the nuclear area has no relation to the number of traits found, for the Kiowa, six or seven hundred miles

¹ Our knowledge of the sun-dance among the Northern Cheyenne is scanty. They probably fall into the same group with the Southern Cheyenne, and have been so shown in each map, but with a query.

away, have as many traits as the immediately adjoining Assiniboin, and the Ute, who are at the same distance from the Grosventres as the Arapaho, have only a third as many

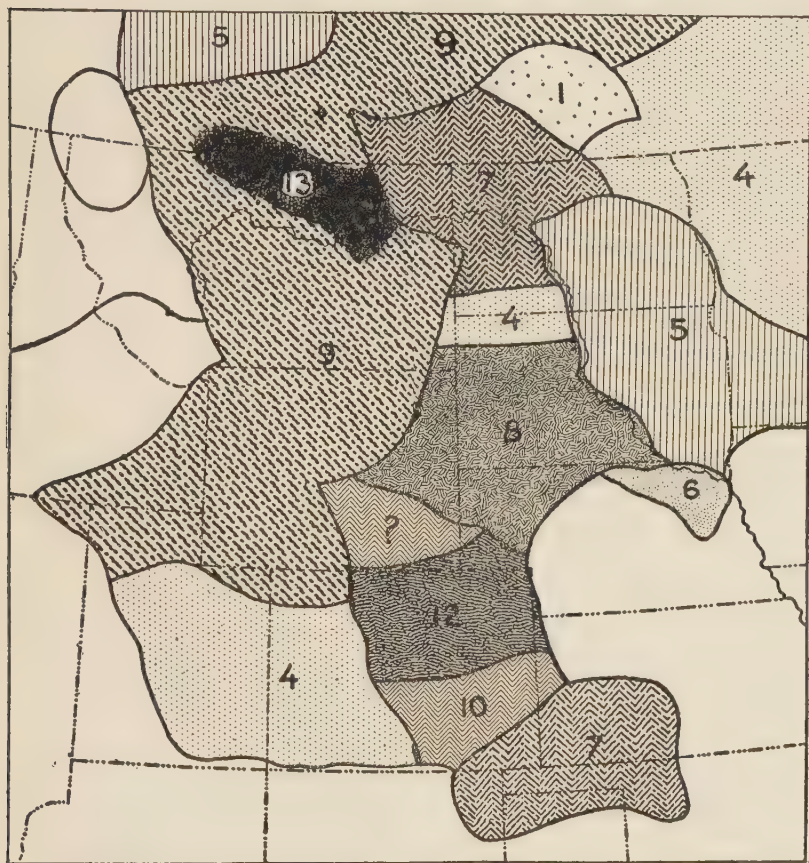


Figure 23.

Distribution of fourteen primary traits of the sun-dance.

traits as they. It is evident that the plotting of the actual distribution does not reveal an orderly, concentric, and definitely zoned diffusion. There is, to be sure, a rough and partial zoning, but diffusion of the complex has nevertheless occurred erratically, as in the case of single traits.

A further point is also to be noted. From his analysis of the sun-dance Doctor Spier makes it clear that the torture traits in the complex are not integral to the whole, but

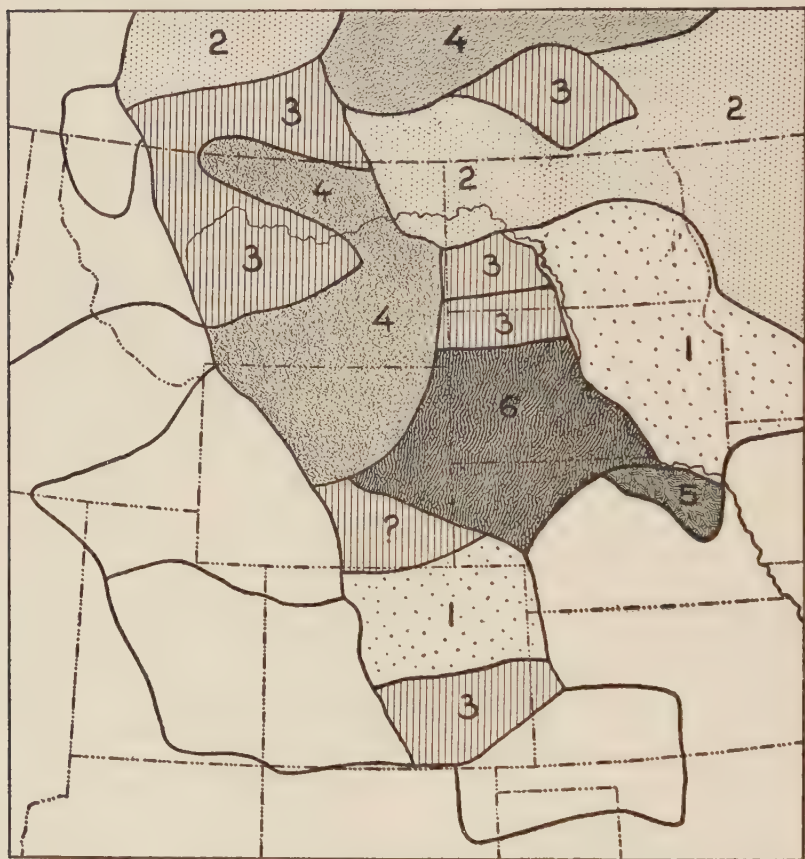


Figure 24.
Distribution of torture traits in the sun-dance.

have originated among the Oglala Sioux probably, outside the centre for the sun-dance itself, and have diffused, at least in part, independently from that centre. If we plot the distribution of these traits alone we find the distribution shown in Figure 24. This shows a nuclear area lying

toward the eastern border, and indicates a diffusion as erratic as in the former case and one following clearly different lines.

It emerges from all these details of distribution, that the process of diffusion of the trait-complex of the sun-dance has been a quite involved affair, for not only has it been spread in part by actual popular movements, but we find various centres of diffusion from which the ceremony as a whole as well as the subsidiary torture traits have spread. The simpler, most basic traits have the widest distribution and are found among the marginal tribes; the elaboration has taken place mainly in the nuclei, whence the successive specializations have diffused erratically toward the margin. We have, thus, essentially the same phenomenon as in the case of the primary diffusion of individual traits.

These conclusions differ somewhat from those reached by Doctor Wissler in his treatment of the problem. He is seeking to demonstrate the zoned, concentric diffusion of the complex, its regularity, and the definite relation between distance from the nucleus and number of traits present, which is essential to his theory. After giving a tabular statement of the distribution among the various tribes, of a selection of eleven of the basic traits of the complex, he asks whether the "ranking of the tribes as given is consistent with their geographical positions," for on the basis of a concentric, symmetrical diffusion one should be able from such data "to predict the general geographical positions of the several tribes" and, conversely, knowing the "geographical positions of the tribes . . . to predict their respective ranks in such a table." He answers his question affirmatively, and as evidence presents the schematic diagram shown in Figure 25, which he says shows a close correspondence between the number of traits possessed and the geographical position of the tribes. He then, on the basis of this

diagram, concludes that "a reciprocal relation does exist between geographical position and the place a tribe holds in a culture complex."

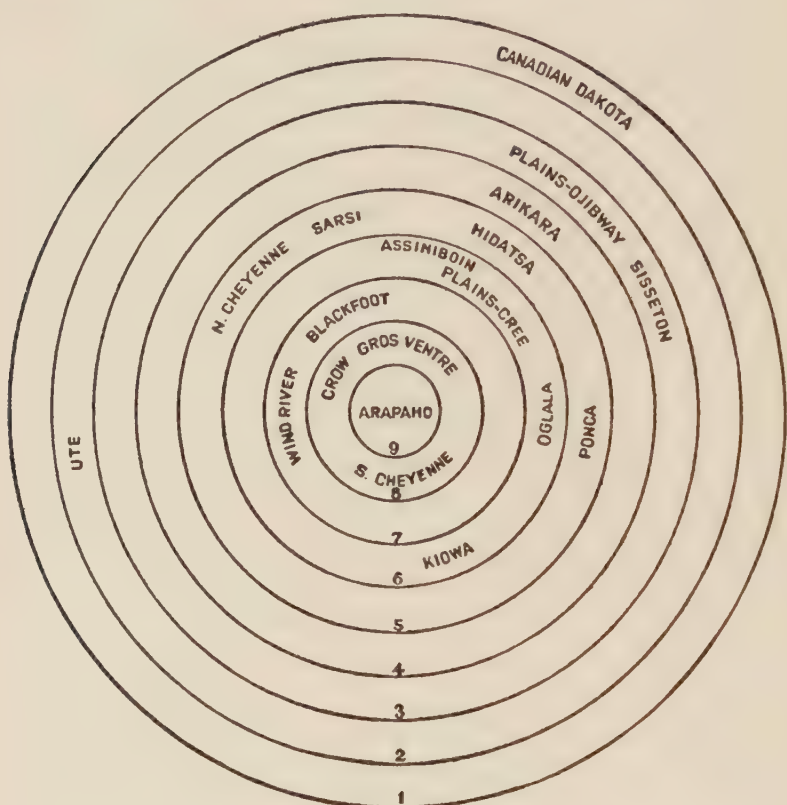


Figure 25.

Schematic arrangement of Indian tribes on the basis of the distribution of eleven basic traits of the sun-dance, for comparison with their geographical positions.

(After Wissler.)

It is quite true that the schematic diagram of regular concentric circles seems to bear out Doctor Wissler's claims, but a brief comparison of the diagram with the *actual* distributions of his eleven traits, given in Figure 26, will show how extremely misleading the diagram is. For example,

his diagram shows the Ute with two traits, as being six times as far away from the Arapaho nucleus as the Southern Cheyenne, who have eight; actually the two areas ad-



Figure 26.

Actual distribution of the eleven primary traits of the sun-dance selected by Wissler.

join each other. The Grosventres are shown as though they were as near neighbors as the Southern Cheyenne (as they should be if Doctor Wissler's theory were true), but, they are actually four times as far away! Only when dra-

gooned into a misleading schematic diagram do the facts substantiate the theory; the facts themselves emphatically deny that there is, in the sense Doctor Wissler implies, "any reciprocal relation" between geographical position and the extent to which a given tribe exhibits the traits of a complex.

I do not wish to imply by this that there are not many instances in which, in general, the farther away from the nucleus of a complex one goes, the fewer are the traits found. Such a situation is unquestionably the normal one, but it is true only in a general way, and the distribution is far less beautifully symmetrical than Doctor Wissler suggests. Indeed, the very next instance which he discusses, that of the diffusion of the self-torture concept, is another case in point, for here again only by distortion of actual positions can the concentric circle diagram be drawn. Still more striking is the instance of the grass-dance whose constituent traits are treated by Doctor Wissler in the same way. He declares that here also is confirmation of the theory of zoned, concentric diffusion, for the tribes having the largest number of the component traits "hold the centre, and the other tribes range around them in an order comparable to that in the sun-dance."¹ Doctor Wissler gives no diagram in this case. In Figure 27 the actual distribution of the traits is shown; and one wonders how by any possible manipulation they can be thought to buttress the theory. For the originators, who have the largest number of traits and occupy a central position, are almost surrounded by areas in which relatively few traits are found, whereas two of the three tribes with the next largest number of traits to the nuclear tribe, are marginal in position. The Menomini and Arapaho have each four traits, but the former are twice as far from the Teton nucleus as the lat-

¹ Wissler, *op. cit.*, p. 195 *seq.*

ter, and have tribes with only two traits intervening; the Pawnee, on the southern margin, have seven, although their neighbors all have but two.

Since continuous diffusion normally gives a roughly

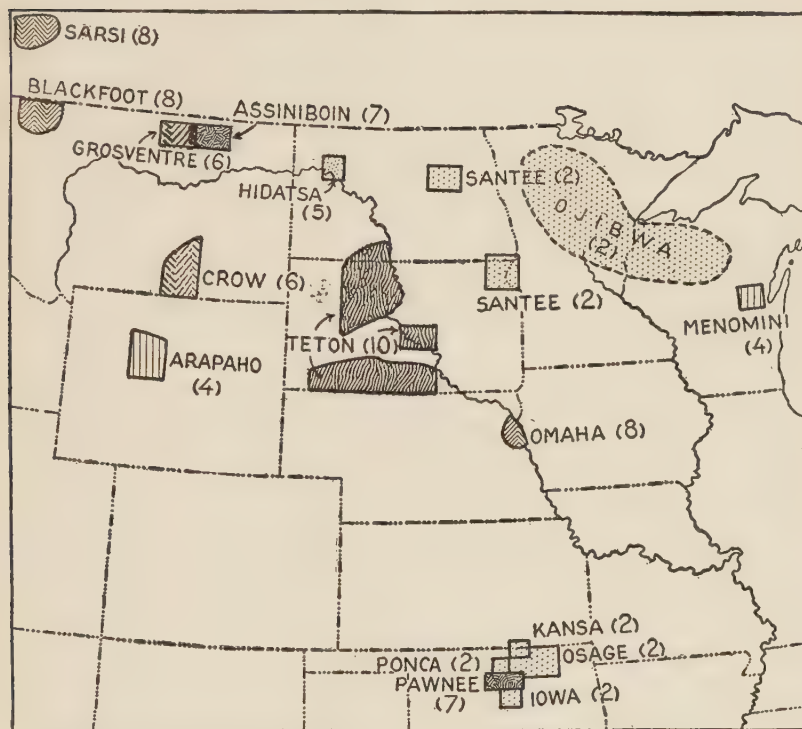


Figure 27.

Distribution of grass-dance traits.
(Tribal location by Indian reservations.)

zoned but asymmetrical and erratic distribution, the almost complete inversion here, suggests that the phenomenon may be due to some discontinuous factor. Migration seems ruled out, since the whole complex originated and spread since the placing of the tribes on permanent reservations.

The instance is of importance, however, quite apart from the peculiar inversion which it shows. In an earlier paper¹ Doctor Wissler has ably discussed the actual history of the complex. He shows that its origin among the Teton Dakota was the result of a fusion of traits derived from various sources, and, in its subsequent spread, some tribes received it three times, in as many differing forms. In its diffusion it was furthermore strikingly subject to the culture pattern of the various adopting tribes, so that, as Doctor Wissler says, "certain dominant ceremonial concepts of the respective localities have been incorporated in the grass-dance, and have inhibited the continuance of others." Thus in its greatly changed form among the central Algonkian tribes, where it is known as the dreamer's-dance, the typical central Algonkian calumet ceremony and offering of tobacco are introduced, whereas most of the regalia worn in the dance in its original form are discarded.

The moral of this is plain. The primary diffusion of trait-complexes of this sort follows the type of that of the individual trait in being erratic and asymmetrical, although normally roughly zoned. When they pass, by secondary diffusion, into a neighboring culture they may become, in the space of a single generation, so radically modified as to be barely recognizable. In the face of evidence of this sort, how can one believe that complexes of purely accidental type should have been able to pass changeless and unscathed through environment after environment, and culture after culture, over a period of centuries or thousands of years? Yet this assumption is one of the corner-stones of the theories of the modern diffusionist schools. In the following chapters we shall see that there are abundant other grounds on which the validity of these theories can be assailed, but

¹ Wissler, C., "General Discussion of Shamanistic and Dancing Societies," *Anthrop. Papers*, Amer. Mus. Nat. Hist., vol. 11, p. 12, p. 862 *seq.*

the demonstrated mutability of accidental complexes seems alone sufficient to invalidate the whole.

We have seen that in the diffusion of trait-complexes, within the area of their origin, the erratic spread does indeed often produce a roughly zoned distribution, but one which is far from symmetrically concentric. The nucleus is rarely central in location and there is no necessary relation between distance from the trait nucleus and the extent to which the complex is developed. Nor is there any similar relation in time, *i. e.*, we cannot say that because one tribe is nearer to the nucleus of the trait-complex than another, therefore it will have received the complex sooner. In endeavoring to prove the universality of a symmetrical, zoned diffusion, Doctor Wissler cites examples to prove its applicability to time as well as space. He says that "the extent of diffusion is somehow proportional to the time," and, although recognizing that in the rate of diffusion there is an unknown factor present, yet believes that, without knowing this, conclusions of worth can be drawn from distribution alone. In the example which he gives of the diffusion of the Peyote cult, however, both the data and the somewhat inaccurate map contradict the theory. For one finds that the variability of the unknown factor is so great as quite to negative the value of conclusions drawn from distribution alone. Thus it took no longer for the complex to diffuse from Oklahoma to the Winnebago in northeastern Nebraska, some five hundred miles away, than it did to reach the Kickapoo on a neighboring reservation, only a short distance off. From Doctor Wissler's map one would conclude that even within the narrow and very irregular belt which forms the centre of diffusion for the complex, there were tribes to which knowledge of the cult had not diffused. Such "vacuoles," however, within the nucleus actually are not there, but represent errors in plotting the

map, as reference to his own table on the opposite page will show. In time, therefore, as in space, the diffusion of a complex is irregular, and one cannot, with any certainty, deduce merely from distances on the map, even the relative time intervals involved in diffusion.

From the examples given it will have been seen, I believe, that trait-complexes of the more or less clearly accidental sort become attenuated in the course of primary diffusion and, when they pass into neighboring cultures, rapidly disintegrate. The attenuation and disintegration are the result not only of elimination of traits from the complex, but of the incorporation of new traits, originally unrelated to it. By loss and accretion the complex, as it diffuses farther and farther, becomes ultimately quite unrecognizable, and may survive in another culture only as a single trait now incorporated in a different complex. Although it should hardly be necessary to call attention to it, the point may be noted that traits once lost out of a complex in the course of its diffusion are permanently lost; they do not and cannot resurrect themselves at a later stage in the diffusion, as the changing and dwindling complex passes farther and farther on. As I say, it would not seem necessary to note what is seemingly so obvious, were it not for the fact that the modern diffusionists quite overlook it in building up theories of world-wide trait-complex dissemination. A trait lost from a complex is like a lost art gone for good, unless it be reimported into the complex from some other source. But in such case the original complex can get no credit.

We are brought finally to another feature of the accidental trait-complex. In the case of an elaborate ceremony, such as the sun-dance, there is a patent, if actually accidental, association between the individual traits of which it is composed. They have come together gradually among a particular people and have been built up and elaborated

into what is, for its creators, a more or less logical whole. In the case of the sun-dance, for instance, the original simple nucleus of the ceremony has become elaborated by incorporating the torture traits and a further slow pyramiding of modifications and amplifications. In spite of the demonstrably historical character of the association of traits which thus develops, such a complex has a perfectly obvious unity. The whole thing might have grown along quite different lines; it happened to grow in just this way. Yet in spite of the strong bond which historical association has provided, such complexes are, as we have seen, liable in the course of diffusion to inevitable change. It is different, however, with such complexes as that of Chinese or any other whole culture where one merely selects, out of the scores or hundreds of traits actually composing the people's culture, a particular small group which is then called a "complex," simply because of their spatial and temporal juxtaposition. Any such selection is more or less arbitrary, both as to number of traits selected and their relative importance. And any such arbitrarily selected group, dubbed a "complex," has, because of its artificiality, even less chance of persistence in diffusion than one comparable to the sun-dance. Now it is with complexes of this highly artificial character that the modern school of diffusionists deal, and it is of the essence of their theories that such complexes should be rigid and unchanging. That in the nature of things they could hardly be so, is, I believe, evident from their character in comparison with those of logical or even quasi-logical type; that as a matter of fact they are not so, is, I hope, apparent from the examples we have considered.

CHAPTER VI

CULTURE PARALLELS

Now that we have given some consideration to the influences exerted by environment, to the phenomena of invention and discovery, and to the processes of diffusion, we are in a position to discuss one of the most fundamental, as it is one of the most puzzling and complicated problems with which the student of culture growth has to deal—the problem of culture parallels.

By culture parallels is meant the phenomenon of the existence in two more or less widely separated areas, between which there has been no known historical contact, of cultural traits or trait-complexes which seem to be similar or even identical. If in Africa, in Melanesia, and in North America, for example, we find a trait or trait-complex which seems in all three cases to be alike, how shall we explain the similarity? There are two alternatives which at once suggest themselves: either the similarity is due to diffusion which has carried the trait in some unknown way from one area to the others, or the similarity is due merely to chance and the basic unity of the human mind, which, confronted with similar conditions, has reacted to them in a similar way. These two radically opposed views have led to the development of two contrasted schools, which see the phenomena of culture growth, thus, from very different angles. The one, grasping at similarities, tries to establish thereby links in a chain connecting the widely separated areas and insists that, whether or not such links can be found, diffusion alone can explain the facts. In their opinion a trait can only have been invented once, and multiple invention, even of the simplest trait, is “unthinkable.”

The other school is ready enough to admit diffusion where historic connections can be definitely proved, or where contacts can be shown to be geographically and culturally possible, but insists that where such cannot be established, the phenomenon is to be regarded as probably due to independent invention. The adherents of this school are more reasonable and less arrogantly assertive of the certainty of their conclusions than are the modern diffusionists. For whereas the more extreme members of the latter insist that not even the simplest invention, such as that of chipping stones or lashing two logs together to make a raft, could possibly have happened twice, the former divide parallels into two classes. The one comprises the simpler traits, the other the more complex, and it is held that whereas the simpler ones may well have been invented over and over again, the more complicated ones are much less likely to have been, and presumptively owe their widespread distribution to diffusion.

Now, although at first sight there would seem to be only these two alternatives of independent invention and diffusion by which to explain culture parallels, there is a third possibility, that of convergent evolution. This view would explain the similarities as in fact only seeming and not real, in that the phenomena were originally quite independent and dissimilar, but that in the course of their historical development they gradually converged until what had started out as two or more unlike traits, finally came to have close superficial resemblance. It is pointed out that the phenomena in the separated areas are analogous but not homologous, and that the proof of the correctness of this view lies in the unearthing of the history of the trait in each area. If by any means we can trace back the present traits to their earlier historical forms, and find these to be increasingly different, then the need to call in any form of diffusion dis-

appears, and we can be certain that the phenomena were in origin independent.

The number of such culture parallels which have been pointed out is large, but consideration of a few selected examples will serve to show the character of the problem and the fallacy of the extreme diffusionists' position.

We may begin with a striking case of almost indubitable independent invention, that of the so-called fire-syringe. This is an ingenious little device for producing fire by means of the heat generated from the sudden compression of air. In form it consists of a small, hollow cylinder of wood, horn, or metal, three or four inches high and an inch or so in diameter, closed at one end, and provided with a tight-fitting piston or plunger, with an enlarged upper end. A small bit of dry tinder is placed in the bottom of the cylinder, the piston inserted and given a smart blow with the hand, driving the piston forcibly down, and thus suddenly compressing the air in the cylinder. The heat thus generated is sufficient to kindle the tinder, which is then immediately shaken out smouldering and used to start a blaze.

Now implements of this sort, made of bamboo, wood, horn, or brass, are known to have been widely in use among a large number of native peoples extending over a continuous area from northern Burma south and east through Indo-China, the Malay Peninsula, and Indonesia as far as the Sunda Islands, east of Java. It also extended northward as far as the northern Philippines. It was in use both by the more sophisticated Malay peoples as well as by various wild tribes almost untouched by any European influence. Each portion of this area had its own local form of the implement, and there is good evidence that its use extended over this wide range as early as the middle of the nineteenth century, with no suggestion that it was a recent cultural trait.

Except for this clearly defined and continuous area in southeastern Asia and adjacent islands, the fire-syringe was known in only one other region—France, England, and the near-by portions of western Europe. The documentary evidence of its invention here is clear. Prior to the beginning of the nineteenth century it was absolutely unknown. In December of 1802 the discovery that tinder could be ignited by the sudden compression of air was communicated by M. Mollet to the French Academy. In the following year the news was sent to England, and during the next few years experimental demonstration of the new discovery was common in western European laboratories. In 1807 the idea seems first to have been applied for practical purposes, and a patent was taken out in England for a fire-lighter of this sort. In the years following, up to about 1835, the implement became rather well known on the Continent, but never seems to have come into very general use. With the introduction of the lucifer match, which took place in the '30s, the doom of the fire-syringe rang, and it rapidly disappeared from use.¹

We have here a very curious problem. An invention demonstrably unknown in Europe before 1802, not made for practical purposes until several years later, never in general use and obsolete by 1835, appears to have been quite independently invented by savage peoples of southeastern Asia at an earlier date. The possibility of diffusion from Europe to Asia seems to be rather definitely ruled out by the following facts: The period during which the European implement could have been distributed in trade to the Orient is restricted to about twenty-five years or less. Practically all the trade with the regions in the East where the fire-syringe occurs was in the hands of the English or

¹ For the detailed history and a full discussion of this problem, see Balfour, H., "The Fire-piston," in *Anthropological Papers, presented to E. B. Taylor*, London, 1907. Reprinted in *Smithsonian Report*, 1901, pp. 565-594.

Dutch, and at no time apparently, was the use of the implement common in England. Furthermore, no specimen of a European fire-syringe has ever been seen in the Orient, and there is no record of its export. Since we know that the implement was in use over a very wide area in the south-east of Asia and Indonesia as early at least as 1850, it is almost impossible to believe that its use could have spread over so wide a territory and to so many remote tribes in little over a single generation. The skill with which the various tribes make the little instrument, bespeaks long practice and familiarity, and the development of various local styles and types must have required considerable time. While, therefore, it remains as a very remotely conceivable possibility that the invention diffused from Europe to the Orient, every particle of evidence and all the probabilities are against such an explanation. That the diffusion could have taken place in the reverse direction is even less probable, for the considerable scientific literature referring to the discovery, in the earlier years of the nineteenth century, contains no suggestion whatever that those who reported the discovery knew of the existence of the implement in the Orient. We appear, thus, to have a pretty clear instance of independent invention, and one that is especially noteworthy because of the relatively abstruse physical principle on which it rests, a principle which one would hardly suppose a savage folk to discover.

From this relatively sure ground, let us advance a step to an example of a different sort. The custom of betel-chewing is widely distributed over a large portion of southern and southeastern Asia, together with the whole of Indonesia, and extends eastward more or less continuously through Melanesia as far as the Solomon Islands, and into Micronesia at least as far as the Carolines. In practice the procedure is throughout essentially the same, in that small

pieces of the betel-nut (the fruit of the *Areca catechu*) are chewed with a little lime and a piece of the leaf of a species of pepper (the *Chivica betel*), sometimes replaced in Melanesia by a leaf of the *Piper methysticum*, whose root is widely used in Polynesia to make the drink known as kava. The lime is usually carried in a small gourd provided with a wooden spatula.

The precise limits of betel-chewing in Asia have not, so far as I know, been determined, nor has the history of its use been completely worked out. It appears to have been introduced very early into India, probably from Indonesia, and has spread throughout India and into Afghanistan, Kashmir, and the adjoining regions and as far west as Arabia. As the Areca palm is a native of the Malay Peninsula and Indonesia, it is extremely probable that the practice originated there and spread north and west into Asia, and eastward was carried into Melanesia by migratory groups who are known to have drifted in that direction. In the eastern portion of Melanesia the use of betel is comparatively recent.

The parallel to this custom of chewing the betel-nut with lime, afforded by the Peruvian custom of chewing coca with lime, has often been noted, and the assertion frequently made that the New World practice is obviously due to diffusion across the Pacific. In this view, coca has been substituted for the betel, and the instance is but one of a considerable series of supposed trait diffusions which have traversed the Pacific, bringing Asiatic and Oceanic culture traits to South America.

Before considering the arguments and evidence in the case, a few words may be said as to the American use of coca. As practised in Peru at the time of the Spanish Conquest, the leaves of the coca plant (*Erythroxylon coca*) from which to-day cocaine is made, were dried, broken in

small pieces, and chewed with a little lime, taken from a small gourd or other receptacle by means of a wooden spatula. The area over which the use of coca extended was a large and continuous one, reaching from northern Chile, along the highlands and slopes of the Andes north to Colombia, Venezuela, and Panama. In more modern times, at least, its use extended some distance eastward into the great Amazon forest area. Of historical data as to the spread of coca-chewing we have one somewhat uncertain point, but that important. This is that there is said to be no trace of the use of coca on the Peruvian coast in the earliest period of Peruvian history, its first appearance there being coincident with the first influences of the early Andean or upland cultures. Except, then, for its supposed relatively late appearance on the coast in Peru, and the fact that its use was introduced into Chile by the Inca, we have no historical data as to its spread. Apart from its relatively late appearance on the Peruvian coast, there is no other place on the western shore of the continent until we reach Panama, where the use of coca was known. Everywhere north of Peru it was confined to the highland region, or east of it.

Coming, now, to the hypothesis of a diffusion of betel-chewing to South America, where coca is supposed to have been substituted for it, we may note the following points. First, that nowhere in the South American continent has any trace of the *Areca catechu*, *Chirica betel* or *Piper methysticum* been found. Second, that neither of the two former occur at any point in Polynesia or Micronesia between the present eastern limit of the use of betel and the South American coast. Third, that we have good evidence that the use of betel is and has been slowly moving eastward in Melanesia, encroaching on the area in which kava is in use. We have numerous examples of the supercession

of kava by betel, but no case where the sequence is reversed. There is thus no reason to believe that betel-chewing was at any time in the past in use farther east, and so any nearer to the South American coast than it is to-day. If this is so, then the bringers of the trait must have come from Melanesia or Indonesia direct to the shores of the New World, passing through all of Polynesia without leaving any trace of the trait behind. This is a supposition so difficult as to require extremely convincing proof before it could be accepted.

If we turn to the American end of the supposed line of diffusion, further difficulties await us. It has been noted that there are no traces of the Areca palm or the other vegetable ingredients of the betel "quid" anywhere in South America, where they must have been introduced, if one supposes the voyagers to have actually brought the plants with them. It is very doubtful if the arid climate of the Peruvian coast would permit their growth under any circumstances. The coca plant itself is one of some eighty-odd species of the genus in America, *all* of which grow wild only on the eastern slopes of the Andean chain or eastward from there. Although there is no certain evidence of the actual home of the particular species used, the heart of the region of its early growth seems to have been the Peruvian montaña from about 7° S. to a few degrees north of the equator. At the time of the Conquest the main area of Inca production lay to the east of Cuzco. Incan attempts to grow the plant on the coast failed, as have modern endeavors urged by the profits from its production. These facts make it clear that no wanderers from across the seas, bringing the habit of betel-chewing, could have found on the coast to which they first must have come, the coca plant which they are supposed to have used as a substitute. To imagine that a handful of strange wanderers, sea-worn

after their unbroken journey in frail canoes across five thousand miles of open sea, could have made their way inland across the Andes to the tropical forests of the montaña, and there sought out from among its rich flora, the one plant which could replace their lost betel-nut—is to abandon all vestiges of common sense. Further evidence, however, is supplied by chronology, for since the use of coca was apparently brought to the Pacific coast of South America by the earliest Tiahuanacan influences coming to the shore from the highlands, we can place the date as occurring not later, roughly, than the fourth or fifth century. Its use in the highlands, then, must reach back for some time before this toward the beginning of the Christian era at least. That its use must be old in the Andean area is shown by the important and varying rôles that it played in several Andean cultures, particularly in Colombia, where it took on a religious function differing from that in Peru. That in the early centuries of the Christian era the knowledge of betel-chewing was still confined to Indonesia seems probable, as its spread to and in Melanesia is a relatively modern affair. Thus the hypothetical diffusers of the trait must have set sail from Indonesia, adding another couple of thousand miles to the length of their already impossibly long voyage. Lastly, it may be noted that one element in the betel-complex, *i. e.*, the use of the pepper-leaf, is totally missing in America and has no substitute, and that with coca-chewers the saliva is swallowed and not expectorated, as is the case with betel.

All the actual evidence and all the probabilities are thus solidly against the attempt to account for coca-chewing as the result of cultural diffusion from across the Pacific. On the other hand, it has been pointed out that other Indonesian-Melanesian traits are to be found in South America, such as the pan-pipe, tie-dying, terrace irrigation, etc. In

the opinion of diffusionists, the presence of these associated traits, which form a trait-complex in their opinion, must overrule all objections, and in itself constitutes proofs of trans-Pacific diffusion. That is, a single parallel trait may be doubtful, but if there are several, the probability of independent invention becomes very greatly reduced. For the moment, we will leave this argument aside and return to it a little later, and consider some facts of another sort, which are relevant to the discussion.

Reduced to a single, general statement the actual parallel in culture traits observed between southeastern Asia, Indonesia and Melanesia, on the one hand, and South America on the other, is the use of a masticatory with lime. Two plants are used for this purpose in the first area, one, and that a wholly different one, in the other. Now the chewing of some form of narcotic or sedative with an alkali (lime or ashes) is a practice far more widely spread. Over considerable parts of Australia, pituri (*Duboisia Hopwoodii*) is chewed, mixed with ashes. Over a wide but non-continuous area tobacco is chewed in the same way. In Kamchatka it was chewed with wood-ashes, the Eskimo of Bering Strait use fungus-ash instead, the Haida of Queen Charlotte Islands and some of the neighboring tribes use lime. It is frequently referred to as chewed with lime in southern California, but the usage here is actually different in that the tobacco and lime are pounded up together, and then made into a bolus and swallowed. The effect is that of an emetic, and its use is clearly parallel to the wider local use of the jimson-weed. In South America the chewing of tobacco and lime again crops up in the Amazon-Orinoco region, adjacent to and in part overlapping the area where coca is used.

It will be seen, then, that in areas so widely separated as southern Australia, Kamchatka, Alaska, and the Amazon

valley, the use of a masticatory with lime is known, and that in the latter region tobacco is used in one section, coca in another. Clearly, if the diffusionists insist that the chewing of coca with lime in South America is the result of diffusion, they cannot escape from also requiring the same explanation for the similar use of pituri and tobacco. If it requires a strong imagination to suppose that the betel-chewing trait was carried across the Pacific to Peru, it stretches credulity to the breaking-point to believe that the same hardy voyagers served as the distributors of the trait also to southern Australia and Alaska! In the latter case, however, we fortunately have definite knowledge as to the date when the practice began, for since tobacco was unknown in the Bering Strait region until it was brought there by the Russians, in the late sixteenth and early seventeenth centuries, the beginning of the custom must have been subsequent to that date; and we know that since then no Indonesian or Melanesian voyagers have frequented the arctic shores.

The diffusionists thus seem caught in a dilemma; either they must insist that *all* cases of chewing a masticatory with alkali are the result of diffusion or admit that *all* may be independent, for if one can be proved independent, then the whole case breaks down, and all may be so. One cannot prove absolutely that the Eskimo practice was not derived from Russian sailors, but the great probability is that it represents the substitution of tobacco for the narcotic mushroom long used by the natives of the Asiatic side of the Straits, with whom the Eskimo were in trade relations. If so, it is a trait diffused normally from the Asiatic peoples across the Straits, and the Siberian tribes are hardly likely to be thought to have obtained the idea from Indonesia. While, therefore, absolute proof is still impossible, the burden of proof is very clearly on the shoulders of those who

would claim trans-Pacific diffusion for the coca-chewing, since the chances that the Australian, South American, and Alaskan practices were all derived from the same source are enormously small. Until, then, concrete and irrefutable evidence can be brought to the contrary, we are forced by the logic of the facts to regard coca-chewing and betel-chewing as independent inventions.

It was stated above that the diffusionists argue for the diffusion of cultural traits across the Pacific, because there are several associated traits, a trait-complex as they believe, which seems to be thus disseminated. Before considering this argument it will be well for us to turn our attention to one or two of these supposedly associated traits. We may for this purpose take the plank canoe and the process of tie-dyeing.

There are only two areas in the whole of the New World where plank boats or canoes, in contradistinction to dugout or bark canoes, were known. These areas are the Santa Barbara Islands and neighboring coast of California, and the Chilean coast from about the island of Chiloe, south to the Gulf of Peñas. These two widely separated regions are both on the Pacific side of the continents; the Polynesians are famous for their canoes, which were built up of planks; therefore, say the diffusionists, it is obvious that the American plank canoes were derived from the Polynesian ones, which reached the New World shores either as a result of intentional or unintentional voyages, or may have been drifted thither without living occupants by storms and ocean currents.

At first sight the suggestion seems quite reasonable, the explanation almost obvious, for if nowhere except on the Pacific coast were plank canoes known how can the conclusion be escaped? Let us look into the matter a little more closely. To take the Californian craft first, it seems

pretty clearly demonstrated that they had the limited distribution given. No known complete example of these canoes survives, and we are dependent wholly on the descriptions of the early writers and the few fragments that have been found. The earliest reference to the boats is in 1602, but the first description dates from the close of the eighteenth century. It is clear that the boats were built of planks, apparently three in number, of which one formed the bottom of the boat, the other two being bent around this and sewn to it with sinew thongs, the seams being caulked with bitumen. The boat was propelled by the double paddle, and the people had, in addition to these flat-bottomed, dory-like boats, dugouts and probably also reed balsas, such as were in use farther north along the coast.

The Chilean boat, or "dalca," as it was called, was first mentioned in 1557, among the Chonos and Alikalufs of the fiorded and island-fringed shores of southern Chile. It was built up of three planks, sewed, and had its seams caulked with pitch. In outline it seems to have been much like the Californian boat. For the latter we have as yet no data or suggestion as to its relation to any other form in the northern continent. On the other hand, the "dalca" shows a very obvious relation to the three-piece bark canoe of the region farther south. The question whether this bark canoe is a degenerate copy of the plank boat or whether the latter is an improved form of the bark vessel developed by the more highly cultured Araucanian tribes cannot be definitely settled on the evidence at hand. Such evidence as there is, however, favors the latter view, and would thus tend to make the Chilean "dalca" a local development out of a more primitive bark canoe.

If we turn next, for comparison, to the Polynesian area, we find here at the outset an important and radical difference. All canoes here (except the double canoes) were

provided with an outrigger or outriggers, no trace of which appears anywhere in the New World. If we disregard this fundamental difference we find there are numerous others. Polynesian canoes fall into two clearly defined groups, the dugout type and the plank type. The first is built up of a dugout body to which two side planks are sewed to raise the gunwales and then a bow and a stern piece mortised on. In addition there are batten strips placed over the seams where the side planks join the body of the boat. The plank canoe, on the other hand, is built up of a keel-piece, usually a small log slightly hollowed out or grooved, to which a series of plank strakes are sewn, the planks being provided with flanges on the edges on the inner side, to give greater bearing surface and consequently greater strength to the boat. The distribution of these two types is not mutually exclusive, yet, in general, it may be said that the type with dugout body and raised sides was the prevailing and almost exclusive one in eastern Polynesia, whereas the plank form was more characteristic of central and western Polynesia.

Now it is evident that quite apart from the total absence of the outrigger in America, and its universal presence in Polynesia, the eastern Polynesian dugout type presents no points of similarity with either of the American boats, save in the fact that in both areas planks are joined by sewing. The whole theory and structure of the craft in the two areas are different, and one can see no reasonable way in which the American forms could be derived from the Polynesian. The same holds true in a different way in the case of the Polynesian plank type. For here the keel preserves the essence of the dugout; the sides are built up of several strakes, and these are peculiarly shaped as well. The parallel here again is far from being at all close, and consists primarily in the fact that the boat is built of several planks sewn to-

gether; in form and in all other details of structure they are quite different.

It is further to be noted that the methods of propulsion are also different in the two areas, and although the use of the double paddle in California might well have been transferred to a craft built in foreign pattern, the apparently authenticated use of the oar in the case of the "dalca" does not fall under the same category. It was confined to the plank boat and seems to have been known elsewhere in the New World only among the Eskimo.

It is interesting and perhaps significant that three-plank boats comparable to the California type are known elsewhere in the Pacific area, *i. e.*, among the Ainu of northern Japan and in Korea, and sewn plank boats are also known among the Lapps of northern Scandinavia. Yet the diffusionists have not claimed that Polynesian models served as the prototypes of northern European forms! On the other hand, dugout canoes with rudimentary raised sides, somewhat comparable in principle to the Polynesian forms, actually do occur in the New World, having been made by Athabascan tribes on the rivers of the interior of British Columbia and southern Alaska, and by the Caribs of the Lesser Antilles and Venezuela. The latter raised the sides of their dugout canoes by means of layers of reeds, smeared with bitumen. The principle of securing a greater freeboard by raising the sides of the dugout was thus in rudimentary form developed in the New World, but in areas where Polynesian influence was not possible.

A last word may be said as to the suggestion that the supposed Polynesian models might have been drift canoes, brought to the American shores by chance. A moment's examination of a map showing the ocean currents of the Pacific will demonstrate the great improbability of such an occurrence. In the case of the Californian area, the north

equatorial current flows from east to west and would thus be unable to bring drift objects eastward from Polynesia or Micronesia; the Japan current flows eastward much too far to the north. For Chile the case is similar, the south equatorial current, flowing from east to west, would carry all Polynesian material westward, and although its southern branches do sweep around to the south and east, so that possibly drift objects might thus get into the Humboldt or Peruvian current, this does not impinge on the South American shore until well to the north of the area in which the "dalca" was known. The equatorial counter-current, flowing from west to east, reaches the American coast in the vicinity of Panama. Finally, storm-drifts in Polynesia are uniformly from east to west. Everything, thus, but intentional voyages from Polynesia seems ruled out. The consideration of the probability or possibility of these I shall leave until after the discussion of the next case, that of tie-dyeing.

In the ancient cemeteries of coastal Peru one finds, rather rarely, textiles ornamented with color designs produced by what is technically known as tie-dyeing. Two somewhat different methods were here employed. In one, small portions of the cotton fabric were pinched up here and there and tied around tightly with a waxed thread. The cloth was then quickly dipped in the dye (usually blue or brown), dried, and then the threads untied. When smoothed out the cloth would then show a series of somewhat irregular white spots on a blue or brown ground, the tightly tied areas not having taken the dye. The other method was to roll the cloth up in a very tight roll, tying cords tightly around it at intervals, and then dipping the roll in the dye. When dried and unrolled, this produced a striped result. Tie-dyeing is thus in principle a negative-patterning, *i. e.*, a method whereby the original or basic color of the fabric

forms the pattern against a background of applied color; it is the reverse of positive-patterning, where the design is painted or stamped or printed in color on a background formed by the basic color of the cloth. There seems to be no very exact data as to the age of these fabrics in Peru. They appear to be pretty certainly pre-Inca, and may be very much older.

Tie-dyeing elsewhere in the world can all be traced back in origin to the southeast of Asia and adjacent parts of Indonesia. The Moslem conquests in the latter area carried it north to the Philippines; and the Arabs, having learned the technique in Indonesia, took it with them across Africa as far as Nigeria, and, through the Moors, transferred it to Spain. From thence the Spanish later brought it to Mexico. The technique is very old in India and was early in use in Turkestan, where some have thought that it might have been originally invented. So far as I am aware the history of the technique has never been thoroughly worked out, and it seems still uncertain whether it originated in India or Turkestan and was brought thence to Indonesia during the period of Indian influence in the early centuries of the Christian era, or whether it was first invented in Indonesia and followed the reverse route. All that seems certain is that all known occurrences of this art, from Japan and China to Nigeria and Mexico, can be traced back to this southeastern corner of Asia—except the case of Peru!

In the southeast of Asia and in Indonesia two additional methods of negative-patterning have long been in use, known, respectively, as *ikatten* and *battik*. The former is nothing more than an elaboration, but a very difficult one, of the simple tie-dyeing. In this, instead of tying and dyeing the finished cloth, the tying and dyeing precedes the weaving of the fabric. The warp or weft threads, or

both, are tied and dyed in the hank with the result that the weaving is done with a thread which is alternately, let us say, white and blue, the lengths of the colored stretches varying, but repeating regularly and symmetrically from one end of the thread to the other. As a result, if the colored portions are spaced properly with relation to the width of the web of cloth to be woven, a recurring pattern is produced which may be quite complex. It will be evident that for the successful carrying out of the *ikatten* process, great care and ingenuity must be exercised in planning the spacing of the colored sections in the thread so as to bring out the desired design, and much skill employed in the weaving to keep the weft at an even tension. Indeed, the difficulty of *ikatten* weaving seems greater than in any other form, and is a quite extraordinary achievement both intellectually and mechanically.

Battik, on the other hand, although a method of negative-patterning, follows a rather different plan. In this the finished cloth is painted in appropriate designs with hot wax, so that, when the cloth is dyed, the color does not take on those parts so treated. After dyeing the wax is removed, leaving the pattern in the basic color of the fabric against the dyed background. In this method, by appropriate manipulation involving successive waxings and dyeings, two or three color patterns may be produced.

The problem before us may now be reduced to simple outlines. In southeastern Asia and Indonesia we have three different types of negative-patterning or negative-dyeing employed, simple tie-dyeing, *ikatten*, and *battik*. In Peru we find, apparently at an early date, the first of these methods in use, but no trace of either *ikatten* or *battik* is known. In Polynesia no form of negative-dyeing is in use, nor is it known in Melanesia except in the Santa Cruz group and the neighboring Banks Islands, where it is used

in one form only, reminiscent of the rolled-cloth form in Peru. Here the material (usually a fine matting) is tightly rolled around a wooden cylinder, small stencil-like pieces of leaf being laid between successive turns of the material. This is thus pressed more tightly between the stencils than elsewhere and the dye fails to take at these points. In Kusaie, in the Carolines (Micronesia) a curious degenerate form or rather imitation of *ikatten* is known, where, instead of dyeing the warp, this is made up of a large number of small pieces of thread, of different colors, knotted together.

If, now, the simple tie-dyeing found in Peru is to be attributed to diffusion, it must almost certainly have been brought from Indonesia, since, except for the isolated instance in the tiny Santa Cruz group and vicinity, no trace of the practice has been found in between. The only alternative is to suppose that the technique was once known in Polynesia and has become a "lost art," like the making of textiles themselves. This is of course possible, but it is an assumption that, in the nature of the case, can neither be proved nor disproved.

There are, however, some additional points to be considered. In the first place we may note that there is a possibility that simple tie-dyeing was known in the New World outside of the few cases on the Peruvian coast. Recently Nordenskiöld¹ has called attention to the existence of simple tie-dyeing applied to *tapa*, or bark cloth, among the Matacco and also the Spanish-speaking Indians of the southern Chaco, in Argentina. Few details are given, however, and the process is not discussed in detail, but it appears to be similar to the Peruvian roll-tying. It is a rather far cry from the Chaco to Pachacamac, on the Pe-

¹ Nordenskiöld, E., *Comparative Ethnographical Studies*, III: "The Ethnography of South America Seen from Mojos in Bolivia," pp. 209-220. Göteborg, 1924.

ruvian coast, where the ancient examples just noted occur. We know that the Spanish introduced the tie-dyeing technique into Mexico, so there is a possibility that this is the explanation of its presence here. If it can be shown, however, as seems more probable, that the practice is really aboriginal, it would bear very definitely on the whole problem of this technique in Peru. There have also been suggestions that tie-dyeing was in use among the ancient cliff-dwellers in the Southwest, but no real evidence has yet been given.

It may further be noted that only the simplest form of negative-dyeing was known in Peru. If the bringers of the art had already attained to the knowledge of *ikatten* or *battik* it would be strange indeed if these methods, or one of them at least, had not been introduced too. The absence of both must therefore lead to the conclusion that the transmitters were as yet ignorant of these higher developments, and, since both have been in use in Indonesia for a very long time, this puts back the period of transfer to an early period.

At this point, however, attention must be called to what is, I believe, a significant fact. All along the western coast of South America, from Peru to Central America and southern Mexico, the process of negative-patterning was known as applied to pottery and gourds. In the case of pottery a design would be painted on the pot in wax or gum, and the whole surface then covered with a colored slip, which could not adhere to the pot's surface where covered by the wax or gum "resist." The pot would then be dried and fired, when the pigment would be fixed, the gum or wax "resist" burned off, leaving the pattern to show in the basic color of the pot against the background of the colored slip. This is virtually an application to pottery of the *battik* method. Now tie-dyeing of textiles may be regarded

as in a sense the transference of the principle of negative-patterning to another medium, *i. e.*, cloth. It is true one might logically expect it to have led to *battik* rather than tie-dyeing, yet the similarity of the principle is so clear that it is hard to resist the thought of the possibility of connection between the negative-patterning of pottery and of cloth. The possibility is the greater, in that here in Peru the textile skill shown by the early coastal people is admittedly extraordinary. In fineness of thread spun, their only known competitors were the Indian weavers of the famous Dacca muslins, whereas for variety in weaving technique they stand unique. They were also extremely skilful dyers, using mordants with surprising ability. If anywhere, then, we might expect the invention of tie-dyeing, or rather the transference of the technique of negative-patterning to the medium of textiles, to have occurred here.

Yet, just in this connection, *i. e.*, their phenomenal development of weaving techniques, comes in a disturbing and puzzling fact, namely, that among the varied forms of weaving practised was that of gauze. Wherever elsewhere in the world gauze has been woven, it can be traced back historically to Indian sources, for there in the Old World the first gauzes were woven. Thus, we have in Peru not one but two unique textile traits, tie-dyeing and gauze-weaving, which, associated in Peru, were also associated anciently in India, and which elsewhere throughout the world can both be traced back with certainty to India or south-east Asia. It looks at last as if we had found an instance where the conclusion in favor of diffusion across the Pacific to South America was inescapable, despite the enormous practical difficulties in the way. Before yielding to the apparently inevitable let us briefly see what these practical difficulties are.

We have seen from our discussion of *coça* and of tie-

dyeing that these two traits, if their presence in South America be due to diffusion, must have reached there well back toward the early centuries of the Christian era. We have also seen that unless we bring in, in both these cases, the unproved and unprovable theory of "lost arts," that the traits must have been brought not from Polynesia, but at least from Melanesia, if not from Indonesia direct. For the sake of argument, let us give to the diffusionists the benefit of the doubt, and assume that the traits had to be carried only from Polynesia across to the Peruvian shore. Easter Island, that tiny outlier of Polynesia lying nearly fifteen hundred miles to the eastward of the nearest inhabited Polynesian group and over a thousand miles from Ducie Island, the nearest uninhabited islet, is nearly two thousand five hundred miles from the nearest point on the South American coast. As a source for the cultural traits we have been discussing, Easter Island is a rather unlikely spot. First, because it was culturally the most isolated probably of all the Polynesian islands, since there are no traditions of visits to it, or from it, in the nearest neighboring groups, so that we are led to believe that after it had been reached by the first settlers and the later second immigration it was never reached again. Secondly, because owing to the fact that the island was treeless the canoes were few and small, as they had to be made from such chance driftwood as could be secured. Thirdly, because the islanders seem to have had no double canoes at all, the type in which most if not all of the long-distance voyaging by the Polynesians was done. Since, then, the Easter Islanders were unprovided with canoes capable of making any long journey, we may with almost complete certainty rule them out as possible transmitters of cultural traits to South America.

If we leave Easter Island out of consideration, then the nearest other group, the Paumotu, lies nearly four thou-

sand miles from the American coast. Now the Polynesians were very skilful and adventurous navigators, but the longest traverses of open sea known to have been made by them were but little over half of this distance. The journey from the Society group to New Zealand is only about two thousand five hundred miles and to Hawaii about the same, with the opportunity of breaking the journey at several points in between. Of the various traditional voyages to New Zealand, several were accomplished only with great difficulty and suffering, the crews being half dead from hunger and thirst and barely able to crawl ashore. With all their skill as navigators many a canoe which set sail for one of the more distant groups was lost and never heard of again. The hazard of these long voyages was thus, after all, rather great, and would surely be far more than doubled by doubling the distance to be traversed. The cargo-carrying capacity of even the largest of their double canoes was not very great and the problem of carrying sufficient food-supplies for so long a period would have been nearly insuperable.

The fact, further, that the greater part of the long-distance voyaging was done in double canoes only adds to our difficulties, for had this type of vessel reached the New World shores, we should expect its advantages would at once have been perceived and the use of such craft assured. But double canoes were wholly unknown in America. Indeed, on the whole Peruvian coast, where the immigrants are supposed to have landed, only raft-like balsas of logs or canes were known and used in the considerable coastwise trade.

Let us grant, however, that the tremendous physical difficulties of an open-sea traverse of four thousand miles from eastern Polynesia to Peru was accomplished. In the face of all the odds we cannot believe it could have been

done often, perhaps twice or thrice at intervals of generations or centuries. For, apart from the hazards of the voyage, it must not be forgotten that, granted a successful journey had been made from the Paumotus, let us say, to the Peruvian coast, there would be little likelihood of a *second* voyage being undertaken unless the first adventurers were able to come back and tell their tale! The hazard is thus multiplied by two, or even more, for it is one thing to sail eastward and hit a continent; quite another to sail thence westward and find one's way back to a maze of scattered islets. Magellan sailed through the whole Paumotu group on his way from the straits that bear his name to the Philippines without sighting any of them!

The number of persons, moreover, who might by good luck reach the New World in any one voyage could hardly have been great. The long journeys of the Polynesians were not made by great fleets, and the majority, if tradition may be believed, were made by one or at most two or three canoes, rather than by large numbers. The famous Great Heke or migration to New Zealand from the Society and Cook groups in the fourteenth century comprised only six canoes, and this record stands almost unique. Storms scattered them, disasters overtook them; it would be miraculous if any adventurous party which reached the South American coast comprised in all a hundred men, for a single canoe could carry not much over fifty.

What, then, supposing them to have reached the southern continent, would be likely to have been their fate? If Peru be taken for their landing-place, as is the case with most writers who have adopted the theory of trans-Pacific diffusion, their chances of effective survival would be likely to have been small. For back as far probably as the beginning of the Christian era the population of the Peruvian coastal districts was relatively large, and the people were a

highly organized, warlike folk, rich in supplies, possessed of metal weapons which the immigrants wholly lacked, and living in large and populous city-states. Their houses solidly built of sun-dried bricks, their cities in some cases walled, what chance would a small band of sea-weary, half-starved wanderers have to gain a foothold there? The best one can suppose is that a few might survive as slaves, from whom, it is true, some cultural traits might be learned; but the chance of even such survival is precarious. It is easy to say that, since the Polynesians were great voyagers, they could easily have brought the culture of the west to South American shores, yet when we examine into the actual chances of their success, these are seen to be extremely, even desperately, small. But the chance even that the culture-bringers could have come from Polynesia rests wholly on the acceptance of the belief that *all* the traits brought became "lost arts" there. This, in the absence of any shred of evidence except its necessity if the theory of trans-Pacific diffusion is to stand, cannot be accepted. If, then, these traits were brought across the Pacific to America they must have been brought at least from Melanesia, adding thus several thousand miles more to the already almost impossible length of voyage. And to suppose that traits could have thus been brought through the whole length of Polynesia without leaving any trace of their passage, is to fly in the face of all the known principles of diffusion.

We come at last to the argument advanced by those who believe diffusion to be the explanation of these culture parallels, namely, that the cumulative evidence of so many parallel traits in the same area cannot be ignored, and that these must form a trait-complex transmitted to the New World. When in South America, they say, you find not only coca-chewing, plank canoes, and tie-dyeing, but also terraced irrigation, pan-pipes, and the blow-gun—all traits

wide-spread in the western Pacific and southeastern Asia—how can you deny that their occurrence is due to diffusion, or believe for a moment that so many similar and parallel inventions could take place? The challenge is a formidable one. Is there anything that can be said in reply?

In the first place one may point to the distribution of these supposedly introduced traits: The plank canoe confined to the Santa Barbara Islands and the fiorded and heavily forested shores of southern Chile, nearly five thousand miles away; tie-dyeing to the arid coasts of northern Peru; coca-chewing (originally) to the Andean highlands and the tropical forests along its eastern border; terraced irrigation to the deep, canyon valleys and higher mountain-sides of the Andes of Bolivia and Peru; the blow-gun to the upper Amazon and Orinoco forests and on through the Antilles to the eastern United States; the pan-pipe spread through the whole Amazon-Orinoco drainage and southward through Bolivia to northern Chile and occurring also on the Peruvian coast, and in one or two isolated spots in Ecuador and Colombia. It will be seen that, with one exception, the only area where the distribution of any two of these traits is found to overlap lies in the Andean Highlands and the tropical forests area to the eastward. Only tie-dyeing and the pan-pipe are found together on the coast. Only two traits out of the six, thus, occur together in any area to which the hypothetical culture-bringers could have come. The cumulative force, therefore, of the evidence is greatly reduced. Further, it may be noted that these two traits are, so far as we know, primarily associated in the Old World with two distinct areas, tie-dyeing being specifically Indonesian and known in Melanesia only in degenerate form in one small area, whereas the pan-pipe is primarily Melanesian and almost unknown in Indonesia.

Last, but not least, the adherents of the diffusion theory

are loud enough in calling attention to what may be called the positive side for their case, to the traits of supposed western Pacific origin which are found in South America; they are silent, however, in regard to other equally characteristic traits of Indonesian and Melanesian culture which are *not* found there! The total absence of the outrigger and double canoe has already been alluded to, and one may add at random other characteristic traits, such as domestic fowl, the fire-plough or fire-saw, stringed musical instruments, etc. The absence of these traits is really just as striking as the presence of the others, and adds still further to the difficulty of accepting the diffusion theory.

An unconditional answer of yes or no cannot, thus, with the data now available, be given to the diffusionist challenge. For the majority of the individual traits which they would explain as introduced by trans-Pacific immigrants, either a basic difference can be shown (as in the case of the plank boat) or a much greater probability that they are of native American origin. This has been shown in the case of betel- and coca-chewing, and can be as well demonstrated for the blow-gun, as will be seen in the following chapter. The same is true for terrace irrigation, and strong arguments to the same effect can be put forward for the pan-pipe, in spite of Hornbostel's¹ evidence of tonal identity between certain individual specimens of Melanesian and Brazilian provenance. Of all the cases mentioned tie-dyeing alone, in its association with gauze-weaving, presents a really serious problem. If this one case is admitted as due to diffusion, then, like the camel's nose under the tent, the rest can soon follow! It is perhaps significant that this trait alone of those mentioned did not survive in Peru, for it seems to have totally disappeared before the Inca con-

¹ Hornbostel, E. von, "Ueber ein akustisches Kriterium für Kulturzusammenhänge." "*Verhandlung, Berliner Gesellschaft für Anthropologie*," etc., vol. 43, pp. 601-616.

quest. It is also significant that there is a probability that the technique of tie-dyeing was in use in the Chaco and possibly in the cliff-dwelling area in the Southwest. Should these cases be substantiated, we should have proof of the presence of the art of tie-dyeing at an early period, and over so wide an area that its aboriginal and independent character would be practically confirmed.

The answer to the challenge, then, must for the present be, I believe, the always unsatisfactory Scotch verdict of "not proven." The possibility that trans-Pacific cultural diffusion of some of the traits mentioned (and perhaps others may have occurred) must be admitted, but the preponderance of probability seems against it. That the problem is one of the most complicated and difficult which the student of culture growth has to face is evident, and that its solution must have far-reaching consequences is also apparent.

It may be thought that sufficient space has now been given to the discussion and illustration of culture parallels. The reader's patience must, however, be taxed a little further as there are one or two other examples of a somewhat different sort that need to be considered. In the instances already discussed we have not been primarily concerned with the real identity of the phenomena involved. It was obvious that betel-chewing and coca-chewing were not identical customs, but the analogy was sufficiently close to need investigation. On the other hand, in the case of tie-dyeing, there was no doubt but that the process was the same. We may now turn to an instance where the disproof of diffusion lies in showing that the superficial similarity of the phenomena is misleading, and is due to the action of convergent evolution.

Although so frequently cited, the illustration afforded by what are known as age-group societies still remains prob-

ably the best available example of this type. To its able exposition by Lowie¹ the reader may be referred for details, for only a brief outline of the major facts need be given here, to serve as an introduction to what follows.

Briefly, then, age-group societies are associations (as it happens always of males) the individual members of which are all of approximately the same age. The societies, each of which has its own name, ceremonies of initiation, regalia, functions, and privileges, form a graded series, starting with the lowest composed of boys, say, from fifteen to twenty, the next including youths from twenty to thirty, and so on until the last and highest society would contain only the older men. Such a graded series of societies, where they exist, always plays a very important part in the life of the people, and has been rather carefully studied in the three widely separated regions in which they are known. These are among the Plains Indians of the United States, the Masai of East Africa, and in parts of Melanesia, notably the Banks Islands.

If our inquiry went no further than these general characteristics we might be tempted to regard the phenomena in the three different areas as in some way causally connected, and as due in some way to diffusion. When, however, we study the details or can get light on the history of the institution in each locality, it appears that the characteristic features of age-grouping and seriation of societies are carried out with varying completeness, and that they have come into being in each case as the result of wholly different circumstances. The apparent similarity, thus, of the phenomena in the three widely separated areas is purely fortuitous, and is the consequence of three independent series of converging developments, leading to results that

¹ Lowie, R. H., "Plains Indians Age-Societies: an Historical and Comparative Summary," *Anthropological Papers, American Museum of Natural History*, vol. II, pt. 13.

are superficially although strikingly analogous. The course of this development has been very ably worked out for the Plains tribes by Lowie in the monograph referred to, and illustrates admirably and in detail the many intermediate stages reached at different times or by different tribes, between a condition where we have ungraded societies with no age qualifications and one where age-grouping and rigid grading of the societies are found.

We may now turn to three final examples of culture parallels which will illustrate perhaps more clearly and from a different angle the dangers of the indiscriminate use of the idea of diffusion. Of these the first and simplest is the question of the so-called "crutch-paddle." In analyzing the various cultures found in Australia, Melanesia, and Polynesia, Doctor Graebner¹ found that the handles of canoe paddles were, in this area, of two contrasted forms. They either consisted of a plain, rounded stick like a broom-handle, or were flattened and broadened at the end or provided with a crosspiece like the end of a crutch. In the first type the hand in grasping the paddle is parallel to the axis of the handle; in the second it is at right angles to it. These two types of paddle-handles were associated in Oceania with two of the different cultural strata which Graebner believed he had determined, and in his search in other parts of the world for evidences of the presence of these strata, these two forms of paddle-handle were among the criteria used. In other words, he regarded these differences in paddle-handles as significant traits in culture complexes.

In the following chapter I shall discuss the culture-strata theory proposed by Graebner and elaborated by Ankermann and Schmidt. Here I wish only to note the following facts. All known paddles throughout the world belong

¹ Graebner, F., "Kulturkreise und Kulturschichten in Ozeanien," *Zeits. für Ethnologie*, vol. 37, pp. 28-53; "Kruckenrüder," *Baessler Archiv*, vol 3, pp. 191-204.

essentially to one or the other of these types,¹ and they must, because there is no other practical alternative. The value of such a trait, then, as a cultural criterion is relatively small, since, in the occurrence of either of the types in any particular instance, we have merely one of two possible alternatives. The evidential value, as proof of diffusion, of a trait of this sort, which possesses very slight possibilities of variation, is thus relatively small, compared with one whose range of variation is wide. For in the latter case the occurrence of a particular form out of a considerable series of possible forms has real significance.

Bearing this in mind, let us turn to the problem of the distribution of mummification, a trait which, wherever it exists, Professor Elliot Smith² and Mr. Perry³ claim has been brought there by diffusion from Egypt. Briefly stated, the contention is that mummification is a trait invented once and once only, in Egypt, and that with a large series of other traits forming a trait-complex called by Smith the "Heliolithic Culture," it was diffused by emigrants and adventurers from Egypt some time after the tenth century B. C. to all parts of the world. In proof of this theory of diffusion the occurrence of mummification is pointed out in the Canary Islands and West Africa, in India, southeastern Asia and Indonesia, and so on eastward through Melanesia, Australia, and Polynesia to Peru, Mexico, the eastern United States, and Alaska. We shall consider the whole theory at some length in the following chapter. Here I wish to take up only this particular trait of mummification.

The process or various processes of embalming employed

¹ The so-called knob-handled form is, according to the shape and size of the knob, merely a variation of one or the other primary form. If small, it is little more than a decorative end to the broom-handled type; if larger, it affords a right-angled grip, as in the crutch-handled form.

² Smith, G. Elliot, "The Migrations of Early Culture." Manchester, 1915.

³ Perry, W. J., "The Children of the Sun." London, 1923.

in Egypt have been studied and described by Smith¹ with great ability, the literary sources, such as Herodotus, being amplified by detailed investigation of a large number of Egyptian mummies of different periods. Especial emphasis is laid on the features of the process which are fundamental, in particular the evisceration either through a flank cut or by the perineum; the throwing of the viscera into water; the removal of the brain through an occipital incision; the brine-soaking of the body; the rubbing with oil; the use of aromatic substances in the body cavity; painting the body red; inserting artificial eyes; incisions in or between the toes, fingers, and at the elbows and knees for draining the fluids of decomposition; drying by heat; the removal of the epidermis except that at the tips of the fingers and toes, etc., etc. The complexity and ultimate uniformity of the Egyptian process are stressed, and the point insisted on that it is the reappearance of this complex throughout the long chain reaching from Egypt to Peru and Alaska, which supplies the conclusive evidence of the unity of the custom, the impossibility of independent invention, and therefore the necessity of explaining its wide distribution as due to diffusion.

What are the concrete facts on which this staggering claim is based? For the Canary Islands we can be certain only of the anointing of the body, evisceration through a flank cut, sun-drying, and probably of the use of aromatic substances in the body cavity.² There is no evidence from the mummies themselves of the extraction of the brain, and the only literary reference speaks of its removal through the nose, a method specifically stated by Elliot Smith to be

¹ Smith, G. Elliot, "A Contribution to the Study of Mummification in Egypt," *Memoires Inst. Egyptien.*, vol. 5, fasc. 1, 1906. "The History of Mummification in Egypt," *Proc. Roy. Phil. Soc.* Glasgow, 1910.

² Hooton, E. A., "The Ancient Inhabitants of the Canary Islands," *Harvard African Studies*, vol. 7, p. 39 *seq.*

a late development in Egypt, in use only after the supposed departure of the culture-carriers for the ends of the earth. So far as the flank cut is concerned, of which Smith makes so much, it is pertinent to note that there would appear to be but three practical ways of evisceration, *i. e.*, by a flank cut, by a median cut, or by the perineum. The first and the last were employed in Egypt, and in the Canaries we have the selection of one out of a possible three methods. It may be surmised that the flank cut has been found by experiment to be the most efficient. In the Canary Islands we have, then, a probable four out of the twelve features characteristic of the Egyptian practice.

If we now turn eastward, we find the traits parallel to the Egyptian process rapidly reduced to a minimum. For India we have only more or less doubtful ascription of the practice of mummification to the early historical period; it has not been used by the Hindus apparently for a thousand or two years. All the evidence suggests the rarity of the practice, and we have no evidence for any of the various features of procedure except the anointment and use of aromatic substances. The Todas, in the extreme south, are reported formerly to have preserved the body temporarily, using evisceration through the flank and occipital removal of the brain, the body being then smoke-dried. Since the usual treatment of the dead is cremation, and the temporary preservation is employed only in case the burning had to be delayed, the example is not very convincing, since mummification in the ordinary sense is designed to preserve the body permanently. In Assam and Upper Burma we know only that some of the wilder tribes sometimes smoke-dried the body. In Ceylon and Burma the bodies of Buddhist priests were sometimes preserved temporarily, by evisceration through the flank and then total immersion in honey. Cremation always followed after a time. In none of these

cases have we more than three elements of the Egyptian process present, and sometimes nothing but the artificial drying.

In Indonesia and Melanesia we have scattering indications either of mere exposure to natural dessication and decay on a platform or in trees, or of smoke-drying with or without evisceration for which no details are given. In some of the islands of Torres Straits and on the adjacent coast of northern Queensland, and here only, do we find any considerable recrudescence of the elaborate procedure in Egypt. Here we have the flank or perineal cut, the throwing of the viscera into the sea, occipital removal of the brain, painting the body red, artificial eyes, incision for drainage, oiling and removal of the epidermis with cuts at finger ends, a total of nine out of the twelve Egyptian features. A great deal is made of these resemblances among this very primitive, tiny, and isolated group of black-skinned savages, hidden away where even the adventurous Malay pirates rarely if ever penetrated. At first sight the parallel is undoubtedly striking, but further consideration makes the analogy somewhat less significant.

The use, for example, of both flank and perineal cuts is an employment of two out of a possible three methods, while the occipital removal of the brain is admittedly the only easy method. The disposal of the viscera in the sea (in Egypt they were thrown into the Nile) is, after all, the most handy means of getting rid of refuse. The reddening of the body is a custom widely employed by many peoples all over the world who have no knowledge of mummification at all. Drainage incisions are a logical and natural expedient to hasten the drying-out of the body, and might well have been thought of by people anywhere. Lastly, the striking parallel of the finger-cuts, whereby the skin of the ends of the fingers and toes was removed together with the nails and

given to the widow, is the direct opposite of the practice in Egypt, where they were left on the body. The Torres Straits practice may well be explained as due to the dislike felt by many primitive peoples of having their nail-parings get into the hands of enemies, who might use them magically to work harm to a person. By giving them to the widow all such danger would be eliminated. Or it may even more likely be a modification of the custom, widespread in Australia, for the widow to carry about with her parts of the body of her deceased husband (sometimes specifically the finger-bones). What we have in this case appears to be a case of convergent evolution, in which, to the normal procedure of any practical method of mummification—evisceration, removal of brain, drainage incisions, drying—have been added, for reasons and purposes wholly different from those in Egypt, such additional details as the painting of the body, throwing the viscera into the sea, and cutting and removing the skin of the finger- and toe-tips.

In speaking in the previous chapter of trait-complexes, we saw that traits lost from the complex can never come back into it except as wholly new incorporations. The total absence of these particular traits in all the region between Egypt and Australia shows that even if there was diffusion of the mummification complex, these factors were lost in transit or have been lost everywhere else, and their reappearance in this single remote locality among a very primitive folk is thus purely accidental and probably has nothing whatever to do with any Egyptian origin. They do not then actually make the parallel any more striking.

Polynesia affords nothing that is significant in the way of real parallels. In Tonga the practice of mummification was unknown; in Samoa it was practised only by a single family in the same form as used farther east, in the Society and Marquesas groups, *i. e.*, perineal evisceration, drainage

incisions, oiling, and drying. In Samoa the viscera were burned or buried. Of the presence of the other features of Egyptian practice there is no evidence. In Hawaii there was no true mummification at all, only occasionally a filling of the body-cavity with salt. In other words, the whole Polynesian area lacked, so far as known, two-thirds of the characteristic Egyptian procedure, and used only the natural and obvious means any people would be forced to devise if they made any attempt to preserve the body.

For the New World the evidence of any Egyptian procedure is even worse. In Peru, where mummies are often referred to, there was, so far as any concrete evidence goes, no actual mummification in the true sense at all, for the bodies were merely dessicated by the dry air, without artificial preparation. We have specific reference to the occasional use of evisceration, as in the case of the Inca rulers, where the viscera were preserved in golden receptacles in a special temple. Where the incision was made, however, the accounts do not state, and the only reported data on actual mummies examined (in this case by Elliot Smith himself) show a direct transverse abdominal cut, quite unlike either Egyptian or Oceanic practice. Hrdlicka¹ reports some skulls stuffed with cotton, but does not make clear whether these were merely severed crania or not. If they were, they may well have been trophy-heads. It may be noted, also, that in Peru, although we get none of the series of Egyptian practices *selected by Smith as significant for his theory*, we do find, and for the first time, several features which are strikingly analogous to Egyptian usage. I refer to the careful individual wrapping of toes, fingers, and the whole body, and the attachment of face-masks. Here, if you will, *are* analogies, but analogies which are

¹ Hrdlicka, A., "Some Results of Recent Anthropological Exploration in Peru," *Smithsonian Institution, Miscellaneous Collections*, vol. 56, no. 16.

lacking completely in all the intervening area, and so to be explained as due to convergent evolution, as, indeed, the as yet only roughly outlined history of burial methods in Peru would suggest. For Mexico the evidence for any sort of preservation of the body is precarious.

Neither Smith nor Perry, curiously, appear to have noticed the wide practice of mummification and preservation of the body in Ecuador and Colombia. For Ecuador, among the Caras, our information comes mainly from Velasco, of whose veracity there are serious doubts, but for Colombia we are on safe ground. Here several methods were employed by neighboring peoples. Some of the lower-cultured merely smoke-dried the body, others, like the Chibcha, eviscerated in some fashion and employed aromatic substances. For the whole area, thus, from Colombia to Peru, we find the occasional or general practice of preserving the bodies of the dead, using various methods, from smoke-drying and simple exposure to dry air, to evisceration and the use of aromatic preservatives. There was thus a general background of desire to preserve the body, which took on local, specialized forms. Throughout this region smoke-drying and drying of meat was known, so there is nothing to require the calling in of any *deus ex machina*, in the shape of Egyptian adventurers, to account for the phenomenon.

Further north there is no evidence whatever of the use of mummification except among the Aleuts, in Alaska, where there was no artificial preparation except evisceration, for which details are not given, the body being then merely wrapped in skins and placed in a cave to dry. Dall,¹ however, explicitly states that the whole custom was very modern, assigning it, on the basis of evidence and tradition,

¹ Dall, W. H., "On Succession in the Shell-heaps of the Aleutian Islands." "Contributions to North American Ethnology," vol. 1, p. 90 *seq.*

an age of only one or two centuries. Smith refers to mummification among the Indians of Virginia, Carolina, and Florida, but the actual practice was quite unknown. What was done was to flay the bodies of chiefs and remove all flesh from the bones, which were then replaced in the skin, which was stuffed with sand, beads, etc., and finally wrapped in skins. This is, in essence, only a more elaborate form of the practice of cleaning and preserving the bones of the dead, widely in use in the southeastern portion of the continent.

Perry,¹ in his amplification of Smith's theory, refers to mound-builder and cliff-dweller mummies. As a matter of fact, neither ever existed, so far as we know. In Kentucky and Tennessee dessicated bodies, in part preserved by nitrous deposits, have been found in caves, but they evidence no artificial preparation at all, and are similar to the large number of similar "mummies" found in Coahuila, in Mexico. The same is true of the occasional cliff-dweller or more common basket-maker burials in Arizona and New Mexico. Here the bodies have merely dessicated in the very dry climate, and show no trace of any artificial preparation.

This long and tedious enumeration of the actual facts has been necessary to demonstrate (1) that the statements that mummification was in use over so vast a range are in part erroneous, (2) that the general absence, even where mummification was practised, of the majority of the significant Egyptian details, is noticeable, and (3) that the deductions drawn from the actual facts are quite unwarranted. The claim is made that mummification was invented in Egypt; that the process was so complex that it could not have been independently invented elsewhere; that wherever mummi-

¹ Perry, W. J., *op. cit.*, p. 200.

fication is found it must therefore be due to diffusion from Egypt; and that the proof of this conclusion lay in the continuity of the record and the recurrence of the significant details. The *facts* are that artificial preservation of the body employing any of the practices listed by Smith was of very limited distribution in the New World, and that nowhere in the whole area from Polynesia to Egypt, with the single exception of Torres Straits, is any significant recurrence of Egyptian procedure known. The actual methods employed were everywhere simple, wholly natural, comparable to those used in preserving meat, and only what must have been done were any attempt made to keep the body. Numerous other methods, such as packing the body in lime, sealing it in a coffin, etc., are not mentioned by Smith or Perry, but are examples of the fact that a number of ways were tried out. The only instance of significant analogy with Egyptian procedure is among a very primitive folk, so far removed from all known lines of cultural diffusion that they had remained practically untouched by all the widespread cultural drifts from the West, which influenced the Oceanic lands. The features added here, which were analogous to Egyptian practice, were practically all in vogue among other peoples in neighboring areas in other connections, so that convergence is amply competent to account for the observed facts, and there is no need to seek for a bizarre and inherently improbable explanation.

The theory fails because the culture parallels on which it is supposed to rest really do not exist; they are spurious, in that of the hypothetical parent complex only a few traits are actually present, and these primarily those underlying general traits which could not fail to be present whether the practice were of independent origin or diffused. The *distinctively* Egyptian features do not, as a rule, recur, and when they do, do so erratically in such fashion as to be quite

adequately explained by convergence. But, it may be objected, have we not seen that diffusion normally leads to a sifting out of traits in a complex, so that we ought not to expect the whole Egyptian complex to survive. Is not the partial representation of the trait-complex, by its most basic and universal features, exactly what we should look for on the basis of concentric zonal diffusion?

The answer must, I believe, be no, and for the following reasons. Firstly, because a roughly concentric zonal distribution of traits, presupposes a continuous diffusion where the trait-complex is free to spread as and if it can. In this case we have unbridged gaps of from two to four thousand miles; *the only proof of whose crossing by the trait lies in the acceptance of the very fact of the diffusion which the theory seeks to prove!* The occurrence, thus, of widely separated examples of the simplest form of the trait indicates independent invention, not diffusion, as its *raison d'être*. Secondly, because the distribution, after all, is not zoned even in the asymmetrical, erratic form that we have found it to assume in cases of undoubted diffusion. We pass from the full complex in Egypt to evisceration, brain removal, and smoke-drying in southern India; to smoke-drying alone in Assam; to honey-immersion in Burma; to smoke-drying and evisceration or mere exposure in Indonesia; then to a half dozen or more of the traits in Torres Straits, and so on. There is no gradual falling off as we recede from the supposed originating centre; there is merely an erratic wavering up and down, which is meaningless if we are looking for evidence of diffusion, but normal and expectable if we are dealing with the scattered attempts of people in a series of unconnected cultures, to devise some means of preserving the bodies of the dead. That what some might call the "laws" of diffusion are elastic enough, we have seen, and it is precisely because this case of mum-

mification cannot meet them, even when they are stretched to their limits, that one is forced to conclude that, from the evidence available, the theory of diffusion of the practice of mummification from Egypt is completely lacking in proof.

A last brief illustration, and our survey of the phenomena of culture parallels may be ended. For this we may take the flood-myth. Myths recounting a great flood in which all persons were destroyed, except one or a small group of survivors, are to be found very widely distributed over the world, although less common in Africa than elsewhere. Many of these myths can easily be shown to have diffused from some particular source, so that we have a series of diffusion areas within each of which related forms of the tale occur. Have we, however, any right to regard these various areas as themselves related and the whole series of tales as ultimately derived from a single source, spread by diffusion over half the world? The answer is that we have not, for, apart from the basic idea of a flood from which but few escape, the details and even the fundamental ideas of the tales are different. In one case the cause of the flood may be an accident, in another it is due to divine displeasure, in another to the personal enmity between two supernatural beings, etc. The means of safety may be a boat, or by climbing a tall tree or a mountain; the world may again become habitable by a recession of the waters, or may need to be re-created by the survivor. What we have here is really a series of individual patterns evolved out of the common background of the idea of a disastrous flood. All peoples except those of arid regions must at one time or another have had experience of sudden floods, with resulting loss of life, and the common background idea is thus supplied by well-nigh universal experience. Upon this, mythic fancy builds its individual plot. There is no call to

regard them all as derived from any single source by diffusion, for the invention is so simple and natural that it would be a marvel did it not frequently recur.

From this presentation and discussion of some examples of culture parallels, we may, I think, draw the following conclusions. Parallelism or similarity of culture traits in widely separated and disconnected areas may be due to various causes. The parallelism may be real and complete and explainable as an instance of wholly independent invention; it may be real and traceable to continuous diffusion, with subsequent disappearance in a portion of the area, or to normal discontinuous diffusion; it may be real, but in a strictly limited degree, and due to convergent evolution from originally quite discrete beginnings; or, lastly, it may be specious, in that the only actual parallelism present lies in such broad and basic features that they cease to have real significance, since they are the natural or inevitable outcome of ordinary human experience.

The determination of the proper category for each case that arises is not always easy, the difficulty lying usually in the inadequacy of the available historical data, a lack almost inevitable for all savage and barbarous peoples. In material culture the perishable nature of things not made of stone or metal, must cause inevitable gaps in the visible record, and the value of this negative evidence must always be open to argument. That diffusion is responsible for a large number of apparently disconnected similar traits is probable, but there remains a considerable residuum for which independent origin is the only rational explanation. For common sense and the laws of probability must be applied to all cases, and when an explanation by diffusion requires us to assume that the extremely improbable or almost impossible has occurred, the *onus probandi* becomes very heavy. Where the physical difficulties in the way are very

serious, we must refuse to be carried away by vague generalities and demand very concrete proof, and until such is forthcoming the alternative of independent invention or convergence must be preferred. That diffusion has been responsible for cultural development to a far greater extent than independent invention is quite certain, but occasional independent invention cannot, in face of the evidence, be denied.

CHAPTER VII

THEORIES OF DIFFUSION

IT is a very natural and human characteristic to wax enthusiastic over a hypothesis of whose worth one has become convinced, and to try to explain by its aid, if not the whole cosmos, at least a considerable part thereof. A few generations ago cultural parallels between the customs and beliefs of aboriginal peoples and those of the Hebrews as recorded in the Bible, were explained in accordance with the theories of the times, as the degenerate survivals of ancient Semitic culture, diffused by the Lost Ten Tribes of Israel. Traces of these extremely elusive wanderers were found in every quarter of the globe, and Bushman and Eskimo, Australian and American Indian were alike credited with being their descendants. Although the ghost of the Lost Tribes has long since been laid, except perhaps for some whose judgment is ruled by their imagination, there have been other attempts to explain great groups of complex phenomena and open all their mysteries by some simple and single open sesame. Thus it has been attempted to derive all religion from a belief in ghosts, and evolutionary principles derived from a study of biology have been applied without modification to the problems of the growth of human culture. It is, therefore, not surprising that, with the growing recognition of the immense significance of diffusion as a factor in that development, enthusiasts should have tried to find in it the sole explanation of the whole enormously complicated phenomenon. Two such theories, in particular, have been proposed in recent years and have attracted a good deal of interest as well as many followers. A discussion of these becomes, therefore, necessary in order

that we may see how far they appear to be valid, what are the conclusions to which they lead, and to what extent they conform to the principles we have been trying to work out from a consideration of the demonstrable facts of culture history.

The first of these is the theory of culture strata, developed by Doctor Graebner¹ and later amplified, elaborated, and, in some particulars, modified by Pater Schmidt² and other German investigators and adopted in England by Rivers.³ Doctor Graebner was apparently led to his theory by his study of Melanesian, Australian, and Polynesian cultures. These he analyzed into a series of strata, ranging from a very simple culture characteristic of the most primitive groups in the area, to the more complex cultures typical of the more highly civilized. These several cultural strata or types, marked, he believed, successive historical invasions or migrations of peoples who differed from each other racially, *i. e.*, physically, as well. Each culture comprised a large number of typical traits, which he regarded as forming a true trait-complex. Thus the Old Australian culture stratum was marked by simple clubs, windbreaks for dwellings, the boomerang, etc.; the Totemic culture included such traits as local totemic groups, platform burial, circumcision, the throwing-stick, circular domed huts, etc.; the Melanesian bow-culture comprised the bow, the pile dwelling, pottery, crutch-handled paddle, betel-chewing, etc. Doctor Graebner showed the way in which these half-dozen different cultures were distributed through the Oceanic re-

¹ Graebner, F., "Kulturkreise und Kulturschichten in Ozeanien," *Zeits. für Ethnologie*, vol. 37, pp. 28-53.

"Die Melanesische Bogenkultur und ihr verwandte," *Anthropos*, vol. 4, pp. 726-781; 998-1033.

"Amerika und der Südsee-kulturen," *Ethnologica*, vol. 2, pp. 42-66.

"Methode der Ethnologie," Heidelberg, 1911.

² Schmidt, P. W., "Kulturkreise und Kulturschichten in Südamerika," *Zeits. für Ethnologie*, vol. 45, pp. 1014-1124.

³ Rivers, W. H. R., "The History of Melanesian Society." Cambridge, 1914.

gion, and then, looking for traces of them elsewhere, found them all over the world. In Asia, in Africa, in prehistoric Europe and in the New World, traits of this or that cultural stratum turned up, now singly and now in groups, and the theory was then put forward that this phenomenon indicated the world-wide spread of these cultures, carried by migrations beginning far back in the palæolithic and continuing down to historic times.

Often some or most of the criteria of a culture stratum would be missing, sometimes they were blended, but the presence of two or three of the selected traits was enough to prove the existence in an area, of representatives of the particular culture involved. Distance was no barrier, and Fuegians, at the southern tip of South America, were accepted, perforce, as representatives of far-wandered Australians and Tasmanians or collateral branches of these, if, among the former, some traits also found in Tasmania or Australia were present. The hypothesis seems to rest on the fundamental assumption that diffusion is accomplished primarily by migration; that traits do not usually spread as a result of borrowing, but are carried as cultural impedimenta by drifting human groups. Therefore, wherever we find a number of traits, typical of a particular people, representatives of that group must once have come. We get thus a picture of cultural traits as almost necessarily connected with certain racial groups, and of the development of culture as a successive series of migrations, spreading over the world and overflowing and overlapping each other like a series of lava flows. The oldest have spread as a rule the farthest and are now to be found in the remoter, marginal regions. The theory is thus in a way an expansion of the theory of concentric, zoned, and continuous diffusion, and its application to whole individual cultures which are regarded as sequent stages in development.

The several culture strata defined are based upon an analysis of the cultures of the peoples of Oceania. It might well be asked why should this particular region be selected for use as a yardstick in measuring the cultures of all the world? Why should not the African or Asiatic or American areas have been taken as the basis for cultural determination? Apart from the fact that it happened to be this region where the attempt at analysis was first made by the author of the theory, it might be thought that the reason was that, in Europe and Asia at least, the older culture strata are so deeply buried under the later and higher forms, that their discovery and definition is far more difficult. That it is in areas marginal to the centres of higher culture that the older and more primitive types can best be observed is certainly true, but the American area would be just as useful in this respect as Oceania. In some respects more so, since far better data are available for large parts of it than for Oceania. It would be interesting if one of the followers of this theory should make this experiment, constructing a series of strata based on American rather than Oceanic data. The result would, I believe, constitute the best and most conclusive demonstration of the failure of the whole hypothesis. For by so doing one would get a largely different series of strata, composed primarily of different traits or of similar traits in quite different combinations. And both results could not be true!

The best available way, however, of showing where and how the hypothesis breaks down and how it violates what we believe to have found to be the principles of diffusion, will be to consider briefly the application of the hypothesis to the South American area as outlined by Schmidt.¹ To begin with, the assumption is made that the New World

¹ Schmidt, Pater W., *op. cit.*

cultures were brought by migration drifts passing from Asia across Bering Strait to Alaska and so southward to South America. Relatively little credence is given to trans-Pacific movements, and in this respect the adherents of the theory are in cordial agreement with the generally accepted belief, that the population of the New World was derived, proximately at least, from Asiatic sources. The theory appears to postulate the migration of peoples from tropical southern Asia and Oceania, northward to the arctic environment of Bering Straits, then southward through all the climatic gradations to the tropics again and on to the subarctic conditions of Tierra del Fuego. At the very outset, thus, the hypothesis gives hostages to fortune in accepting the possible maximum of environmental changes, for the gamut of climatic environment and all that it involves must be run three times, with two reversals, in order to bring the cultures of Australia and Tasmania to Tierra del Fuego. It is, I believe, safe to say that no case is known of a typically tropical trait having been diffused or carried by migration to the arctic, or an arctic one to the tropics, so that the odds at the outset are hardly in favor of the theory. Schmidt, indeed, seems to recognize these difficulties to some extent, for he states that the arctic interlude entailed great changes in material culture due to lack of materials formerly used, and that later, on reaching tropical America, the migrants did not always return to these.

A striking instance of the difficulties the hypothesis has to surmount in this respect of changing environment is supplied by the blow-gun. In a previous chapter we have described this weapon and discussed its diffusion in the New World and also referred to it as an example of culture parallelism. It will be remembered that it is found in two areas, one comprising southeastern Asia and the adjacent islands of Indonesia, the other a very large region in the

New World, comprising the Amazon-Orinoco basin, Mexico, the Antilles, and a considerable part of the eastern United States. According to the culture-strata hypothesis the blow-gun was one of the traits belonging to one of the later waves of immigrants to reach America from southeast Asia and neighboring Oceania, and its presence in South America is accounted for by diffusion by way of Bering Straits. It is clear that this assumption involves us in considerable difficulties.

For one must suppose, either that the implement was in use by the immigrants throughout the whole period of their journey, or that it was lost during the arctic episode and then redeveloped on reaching the appropriate tropical environment. The first assumption meets with almost insuperable difficulties, in that in the Bering Strait region there is no bamboo or other type of reed suitable for the making of the simpler forms of the weapon, or wood suitable for making the more elaborate types. Moreover, there are no plants from which the poison could be prepared. The type of animals for which the weapon is best adapted is also lacking and the open, windy character of much of the region is quite unfit for its efficient use, for the lightness of the darts makes it impossible to shoot with any accuracy except in the relatively windless tropical forest. It is further to be noted that, since the blow-gun is quite unknown throughout the whole extent of the area from southern China around through Bering Strait to Mexico, one must assume all knowledge of it to have been lost completely over a stretch of some eight or nine thousand miles. As we have seen, it is impossible either to prove or disprove a "lost art," but in the case of so enormous a gap, the chances for survival in some form or other somewhere are so considerable that very convincing arguments must be brought before one should accept the explanation as valid.

The other horn of the dilemma is no more attractive, for if we assume the use of the blow-gun to have been lost during the northern sojourn, and that the implement was then redeveloped on reaching the Amazon valley, we are postulating a kind of fossilized racial memory for which there is no spark of evidence. Migrations, in the great majority of cases, are slow affairs, and the tremendous distances involved here would have required not generations but centuries or probably thousands of years. To suppose that knowledge of the manufacture and use of a particular sort of weapon could lie half-dormant in a people's memory over any such period verges upon the fantastic. So great, then, are the difficulties which any theory of circum-Pacific diffusion must meet, that extremely concrete and indisputable evidence is required to make it tenable, and this the exponents of the hypothesis have not supplied. We have seen in a previous chapter that the distribution of the various forms of the blow-gun in the New World, is such as very strongly to indicate its local invention in the Amazon basin and diffusion thence to the limits of its American distribution. If we turn to the Old World area in which it is found, a precisely similar situation develops, *i. e.*, there also it has its probable centre of origin in the extreme southeast of Asia or in western Indonesia. In these two areas alone—the Amazon area and southeast Asia—are long-noded bamboos or canes found suitable for the simple form of the weapon; the same series of types are present in both areas, with the addition of one further form among the Malays, where the tube is bored with a metal augur in a solid wooden stick. Since all the simpler forms are found in both areas the argument for independent invention is very strong, since if it were introduced into America in any but the earliest stage, there would be little reason for the simpler forms to develop there. So far as the blow-gun, then, is

concerned, the evidence is almost overwhelming that its presence in America is not to be accounted for by any form or method of diffusion.

Let us, however, return to the general scheme of culture strata worked out by Schmidt, and see how far it meets the facts. In South America he identifies, firstly, the three oldest and most primitive culture strata of Oceania, named by him the Pygmy or Exogamic-Monogamistic, the Tasmanian or Exogamic-Sex-Totem, and the Boomerang or Exogamic-Neutral. These are in South America fused together with the characteristics of Culture I predominant. This blended culture is then found to be typical of a large group of tribes in eastern and southeastern Brazil, and of most all of those extending from the Argentine Chaco southward through Patagonia to Tierra del Fuego. To this mixed culture belong, it is said, the bow, the throwing-club, and boomerang-like forms typical of one or the other of the three basic cultures in Oceania. The various forms of bodily deformation, typical of Cultures II and III—cicatrization, nose-boring, and tooth-extraction—are all admittedly absent, as are also the equally fundamental shield and throwing-stick. The broomstick paddle-handle is, however, said to be universal among these South American tribes as it is among those in Oceania belonging to these three lower cultures. The house types are throughout primitive windbreaks, tents, or beehive-shaped, circular huts. Navigation is but feebly developed, but the bark canoe is typical as in Oceania, and is declared to be merely a degenerate copy of the plank canoes (*dalca*) of Chile. Pottery is unknown, as it should be in these culture strata. Of the four methods used in the disposal of the dead in Oceania, earth burial and cremation occur, but hollow-tree burial and niche graves are lacking. The latter is, however, found elsewhere in South America, but primarily

among the highest-cultured tribes of the Peruvian, Ecuadorian, and Colombian areas. On the social and religious sides little stress is laid, because, on the one hand, these are so imperfectly known, and on the other, do not show any particular agreement with what the theory demands. On the physical side it is said that the theory is borne out by the fact that several of the tribes are "pygmoid," *i. e.*, pygmy-like in stature, although the majority are of normal height or even extremely tall. It is on the basis of these statements that the large series of South American tribes referred to, are declared to be representatives of the first three Oceanic culture strata.

Let us look a little more closely into the facts. Taking the matter of physical characteristics first, it would appear that there was no justification for speaking of "pygmoid" stature. The only short peoples for whom we possess adequate data are the Yaghan and Alikaluf of the extreme south, and their height is well above the upper limits of pygmy stature. If they are to be called "pygmoid," then so must the Kechua of Peru, the present-day descendants of those Inca tribes who developed the highest culture in the whole southern continent! And if a normal short stature is, in the case of the Fuegians, to be interpreted as evidence of pygmy ancestry and extremely primitive culture, then it must be equally so among the Kechua. That the tallest tribes of the whole continent, the Ona and Patagonians, should exemplify a culture supposedly brought by pygmy folk is also rather hard to reconcile with common sense, but the difficulty is solved by declaring that *because* of their tallness these tribes must be put into a subgroup of later origin, powerfully influenced by cultural contact with the "pygmoid" folk!

Turning now to the traits of material culture found among these tribes and regarded as marking them as repre-

sentatives of the three lowest Oceanic culture strata, we find the following interesting situation. The bow, of typical round cross-section, is stated to be universal, although over most of the area almost all possible forms of cross-section beside the round occur. It is also true, and freely admitted, that the typical form of the ends of the bow, insisted on by Graebner as a very important mark of these Oceanic cultures, is wholly lacking, and that the bowstring is of sinew instead of vegetable fibre, as is universally the case in Oceania. Furthermore, the characteristic mode of arrow-feathering is in the main absent. It does, indeed, occur in South America, but mainly among tribes not regarded as belonging to these culture strata. In other words, of the four significant features of the bow belonging to this culture group in Oceania, two are wholly lacking, one is as often absent as present, and the fourth, although generally lacking here, is common in other parts of South America among tribes which are, according to the theory, of different affiliation. As "evidence" for diffusion it is hard to see how one could get a weaker case! It is not, moreover, as if the use of the bow were in any sense, in itself, distinctive in America as it is in Oceania. Its use was, in the New World, almost universal among peoples of all grades of culture, and it is the *absence* of the bow and not its presence which in a few cases lends distinction and character to a culture. If, however, it be contended that there is a great and fundamental distinction between two types of bow, that with round and that with flat cross-section, and that we are here concerned only with the first of these, it may be pointed out that, as already stated, the round type is by no means the only one in use among these tribes. Further, that in regarding the difference between round and flat forms as of fundamental importance, we have a repetition of the case of the broom-handled and crutch-handled

paddle. For the cross-sections of all bows are either round or flat or some intermediate shape, classed for convenience with one or the other extreme. The fact, therefore, that any particular bow is round or flat has relatively little evidential value, as there are no other alternatives than a roundish or flattish form.

In the second and third culture strata of Oceania, which are supposed to be represented in this South American area, bodily deformations, such as cicatrices, nose-boring, and knocking out of teeth are very typical, so that their complete absence among the tribes supposed to be the bearers of these cultures here, would seem to be a rather serious point. It is interesting, therefore, to find it argued that the very fact of the absence of these distinctive features of Cultures II and III is a point in *favor* of the theory, because since they lack these basic characteristics of Cultures II and III, they must therefore be representative of Culture I! The reasoning is a little hard to follow, particularly when it is recalled that these same features are equally unknown among the higher cultures in Oceania, which should then with equal certainty be relegated to Culture I!

The shield and the throwing-stick are among the most fundamental characteristics of the first three cultures of the Oceanic peoples supposed to be represented in South America. There is not only no trace of the latter and only uncertain evidence of the former of these traits among the tribes we are dealing with, but the traits themselves were widely in use in other portions of the continent, in many cases among tribes of the higher cultural groups. As to pottery, although indeed absent in general, there are considerable areas in the region in question where it was in use, and although the broomstick paddle-handle is the normal one for the area, it is also widely prevalent outside it. Lastly, the bark canoe of Tierra del Fuego is, although in

material comparable to those in the Oceanic region, in form and construction quite distinct, and is almost certainly, as we have seen in a previous chapter, a true native form and not a degenerate copy of the Chilean "dalca." Moreover, a form of bark canoe much more similar to the Australian, occurs in South America rather widely, but far outside the region concerned.

Thus, of the nineteen specific traits mentioned by Schmidt, as characteristic of the blended cultures in Oceania, we find that in the South American regions where these cultures are supposed to be present, ten are wholly absent, four are found almost as frequently outside the area as within it, three are relatively rare, and one is really not comparable, although actually comparable forms occur outside the region concerned. When the claim, therefore, is investigated it appears that but a single trait out of nineteen—a house type—is actually *characteristic* of the region. And even of that it may be said, that although the "toldo" type of tent in use over large parts of the area is technically a "windbreak" in that it is usually (but not always) open on one side, it is in construction and material quite unlike the Oceanic forms.

In the face of the facts it is hard to accept the interpretation put on them by the hypothesis, and to regard them as evidence for the derivation of the culture of the tribes of eastern and southeastern Brazil and Argentina from Tasmania, Australia, and Melanesia by way of a circum-Pacific migration. Of the original series of traits regarded as forming a true trait-complex, only one really survives intact, and that one whose evidential value is extremely meagre. But, isn't this exactly what we should expect from a wide diffusion of a purely accidental trait-complex? Did we not come to the conclusion that in such a case the complex would be winnowed out until almost nothing recog-

nizable was left? We did, indeed, but we also concluded that the process was necessarily regular in the sense that if one started with nineteen traits, five of these, let us say, might drop out in passing into the first great environmental contrast, three in the next, two in the next, and so on. That is, the capital of traits with which we started would dwindle slowly or rapidly, but continuously; we cannot, for instance, lose the eighth trait in one stage of diffusion, and be caught with it again three stages later on! But that is the sort of thing which occurs here. It is a repetition of the situation which developed in the case of mummification. Here the large majority of the nineteen traits with which we are supposed to start, play hide-and-seek all around the rim of the Pacific. Some, like the use of cicatrices for body ornamentation, disappear for good and all a short distance after we start; others, like the shield, disappear only to reappear and disappear again.

The whole matter can be rephrased thus. If the nineteen traits actually form a trait-complex, as the hypothesis declares, then they must show in their distribution a certain correlation. Thus, in the South American continent, for instance, the throwing-club and bark canoe ought to occur together among the same tribe more often than either does alone or in association with some different trait. Now this correlation between the series of traits does not, as a matter of fact, exist, so that the only conclusion possible is that the assumption that we were dealing with a real complex is without foundation. In connection with one of the other Oceanic culture strata which the hypothesis finds in the New World, Kroeber¹ has specifically investigated this point and finds the same result. It is clear, then, that the primary assumption on which the whole hypothesis rests,

¹ Kroeber, H. L., and Holt, C., "Masks and Moieties as a Culture Complex," *J. Roy. Anth. Inst.*, vol. 50, pp. 452-460. (The article gives an excellent criticism of the whole Graebnerian theory.)

is false, *i. e.*, the series of supposed culture strata or trait-complexes have no real existence.

We might consider in succession each of the different "strata" of Oceanic culture whose presence in South America the theory asserts, but should get in every case a similar result. In the face of the facts, then, we have apparently no option but to hold the hypothesis to be invalid. The well-nigh insuperable difficulties, which the tremendous migration through varied environments presents, would alone be sufficient to throw strong doubts upon it, and require particularly definite proof before it could be accepted; the meagreness and conflicting character of the evidence actually offered, in its turn, would render acceptance extremely difficult; and the fact that the assumed trait-complexes are themselves only an illusion, removes the foundations of the whole structure, with apparently inevitable results.

Although as I have tried to show, the hypothesis of the migration of Oceanic cultures throughout the New World does not seem to be valid, it appeared to be revived recently by a literal miracle. For Doctor Rivet in a number of elaborate papers endeavored to show that, on linguistic grounds, the hypothesis could be triumphantly proved. He sought to show that the language spoken by the Tshon or Tsonecan tribes of Patagonia was very closely allied to the languages of Australia.¹ Obviously, if such a relationship were true, the culture-strata theory would not merely be strengthened, but to all intents and purposes absolutely demonstrated. For unless some wholly miraculous means could be devised for bringing the Australians (who had only the crudest of canoes) directly across some seven thousand miles of open sea, they must have made the much longer land journey around the whole margin of the Pacific. And, as if this were not enough, Doctor Rivet also endeav-

¹ Rivet, P., "Les Australiens en Amérique," *Bull. Soc. Ling. de Paris*, vol. 26, pp. 23-63.

ored to show that a group of Indian languages in western North America was equally closely affiliated with the Melanesian-Polynesian languages.¹

The mass of evidence brought forward in favor of these views is at first sight astounding, and one is tempted to believe that what seemed incredible and wholly unreasonable must, after all, be somehow true. On further consideration, however, a serious flaw in the argument begins to appear. The similarities between the Tshon of Patagonia and the Australian languages are amazingly close; they are *too* close to be real! For in many instances the words in use for a thing are practically identical in both areas. The Tshon, if they were indeed the descendants of a group of Australian aborigines who had come to Patagonia by the circum-Pacific route, must have been separated from the parent group, with no possible means of communication, for many thousand years. If there is one thing certain about language, it is that it is constantly undergoing change. The change may be slow or rapid, but under no known circumstances can a language stand still. One has but to compare modern English with that of Elizabethan times, with that of Chaucer, with Anglo-Saxon, to see what changes a thousand years or so has brought. To suppose, therefore, that the speech of a South American branch of the Australian languages, separated from its source for millennia, should not be subject to the universal process of change, is quite impossible. If Tshon had been found to be very remotely but still demonstrably related to the Australian languages; if the terms for similar things in each area could only with great difficulty be shown to have any resemblance, then, paradoxically enough, the case would have been very much stronger. As it is, it is literally too good to be true.

¹ Ditto, "Les Malayo-Polynésien en Amérique," *J. Soc. Americanistes de Paris*, vol. 18, pp. 141-278.

What is the cause, then, of this apparent similarity between two languages which we must still believe to be wholly unrelated? An explanation, or at least a partial explanation, comes, on further consideration, to view. The comparisons made are in one sense illusory, in that they are not made between one language in Patagonia and one language in Australia, they are made between one language in Patagonia and a whole series of a hundred or more languages in Australia. No wholly satisfactory and definitive study of the Australian languages can probably ever be made, since so many of the tribes are now extinct, and no reliable data was secured before their disappearance. On the basis of what has been done, however, we know that the many languages fall into a number of stocks or groups, each comprising many separate languages. It is evident, therefore, that the similarities found between Tshon and a whole series of often widely differing languages, mean comparatively little. Between any two languages in the world one will find a few cases of similarity depending on the doctrine of chances. In this case, however, if one can for any single Tshon word, look through the vocabularies of a hundred languages to find an analogous sounding form, the chances for success are enormously increased. If to this be added the fact that Tshon itself, and the vast majority of the Australian languages have been so imperfectly recorded that one cannot be very sure of the exact form of the words anyway, and that errors and misunderstandings were almost inevitably fairly common, the evidential value of the parallels discovered is still further reduced. The same is true for the reported affiliation between the Melanesian-Polynesian languages and the Hokan stock in North America, only here the opportunities for chance resemblances are further increased. For the comparison is made not between one language in America and a group in Aus-

tralia, but between a group of some forty languages and dialects in America and nearly five hundred in Oceania!

It seemed at first sight that the linguistic data published by Doctor Rivet must finally settle the whole controversy over the culture-strata theory, and that further argument was quite unnecessary. With sober second thought, the position of those who contended the validity of the theory appears by no means so desperate. The explosion, although for the moment terrifying, does not after all seem to have breached the defenses built of ascertained facts set in the mortar of logic and common sense, which had hitherto seemed to keep out the hordes of adventurous circum-Pacific travellers. Yet, pleasantries aside, when all allowances are made, the residual number of rather striking similarities is somewhat surprising, and it behooves linguistic students to examine the whole phenomenon with care and with no special thesis to prove, to see if they can find for it a wholly satisfactory explanation.

The culture-strata hypothesis which we have just considered attempts to explain the cultures of all the world's peoples as the result of seven or eight successive and world-wide migrations, setting out from somewhere in southeastern Asia and the adjacent parts of Oceania, and each carrying with it, wherever it went, a supposedly distinct trait-complex. The existing conditions are thus accounted for as the result of the superimposition of these human floods as if they were lava flows. The second diffusion hypothesis, known generally as the heliolithic theory, on the other hand endeavors to prove that practically all cultures in the world, above the level of the pure food-gatherers, are derived from a single source—Egypt. Here and here alone, it is believed, a long series of cultural traits was invented, to be subsequently diffused by sea at the hands of the "Children of the Sun," who went pioneering across the

world in pursuit of gold, pearls, and other, to them, precious substances. Whereas the culture-strata theory assumes its migrations to have taken place over the whole period from the palæolithic onward, the heliolithic theory compresses the whole diffusion of Egyptian culture into a relatively short period subsequent to the tenth century B. C. This is necessary, for some of the traits in the complex had not come into existence in Egypt until shortly before that date. The theory thus attempts, in the words of its founder Professor Elliot Smith, to demonstrate the diffusion of "a very intimately interwoven series of strange customs, which became fortuitously linked one with the other to form a definite culture complex nearly thirty centuries ago, and spread along the coast-lines of a great part of the world, stirring into new and distinctive activity the sluggish, uncultured peoples which, in turn, were subjected to this exotic leaven."¹

The theory was called heliolithic because of the prominence in the supposed culture complex of sun-worship and the use of megalithic building construction. The outlining of the main features of the theory and its discussion is made somewhat difficult by the fact that its expositors by no means agree either with themselves or with each other on various fundamental points. This is shown, in the first place, by differences in the list of traits making up the supposed Egyptian complex. Smith emphasizes megalithic construction, stone monuments, mummification, tattooing, circumcision, the couvade, massage, cranial deformation, sun- and serpent-worship, divine origin of kings, etc. Perry,² although including most of these, adds such further traits as irrigation, pottery, polished stone implements, metal-working, matrilineal organization, exogamy, and

¹ Smith, G. Elliot, "The Migrations of Early Culture," p. 1. Manchester, 1915.

² Perry, W. J., "The Children of the Sun." London, 1923.

totemism. There are also serious difficulties and differences in respect to chronology. Thus Smith states that the stream of heliolithic culture started from Egypt "certainly" not earlier than the end of the ninth century B. C., and that the complete heliolithic culture had reached India not later than the beginning of the seventh century B. C.¹ Yet he also says² that this culture had already reached India in pre-Aryan times. As the arrival of the Aryan immigration is placed by the best authorities somewhere between 1500 and 1000 B. C., and by some even earlier, the discrepancy is obvious. With these dates Perry is in sharp disagreement, for he states³ that the archaic culture, as he terms the Egyptian complex, was "complete" in Egypt by the beginning of the Sixth Dynasty, *i. e.*, about the middle of the third millennium B. C., or more than fifteen hundred years before the date assigned by Smith. He further adds⁴ that as a culture complex it broke up and underwent a complete *debacle* shortly after this (*i. e.*, the middle of the third millennium B. C.), that the old features of the culture were lost, and that although there was a temporary renaissance with considerable changes in the early portion of the New Empire, the culture went down in ruins to the ground about 1100 B. C. and came to an end! In Perry's view the complex was, even in Egypt itself, fragile and temporary, and he declares that wherever over the world it was carried, there also it was equally ephemeral. And yet this fragile and wholly accidental complex is believed to have endured unscathed the vicissitudes of a diffusion more than half way around the world! It is obvious that the points of view of these two exponents of the theory are very difficultly comparable, to say the least, and that in discussing the theory one must distinguish between them.

¹ Smith, *op. cit.*, pp. 68, 86, 133.

³ Perry, *op. cit.*, pp. 3, 460.

² *Ditto*, p. 75 *seq.*

⁴ *Ibid.*, p. 461 *seq.*

Let us first briefly consider the form of the theory as put forth first by Elliot Smith. In his view the nucleus of the heliolithic culture arose in Egypt about 3000 B. C., in the three associated traits of mummification, megalithic construction, and the making of stone idols. These traits are regarded as genetically related and very intimately linked together. This is on the basis that the increasing desire to keep the body away from the soil, led to the construction first of the rock-cut tomb, and then to the megalithic tomb built of large blocks of stone, and to the construction of sarcophagi. In this, however, the body was not so well preserved as in the dry sand, so an artificial means to accomplish the same end, *i. e.*, mummification, was devised. The stone statues were then made to give an even longer life to an image of the dead, for the originally crudely embalmed body had little likeness to the person. Thus the three traits form, in his opinion, a logical trait-complex.

It was then only an accident that the people, among whom this triple trait-complex had grown up, developed also the other traits forming the whole heliolithic culture, such as sun- and serpent-worship, massage, circumcision, etc., and that later there were added to the agglomeration such other trivial customs as ear-piercing, tattooing, etc. These did not originate in Egypt, but got attached to the really distinctive culture before its world-wide diffusion began. The net result appears to be that the heliolithic culture is assumed to be an amorphous accidental trait-complex of a dozen or more traits, associated with a supposedly logical trait-complex (mummification, megalithic construction, and stone images) which formed the core and nucleus of the whole. The point is made that it is just the trivialness of some of these adventitious traits that proves the truth of the hypothesis, for the fact of their persistence in association

with the distinctive nucleus is evidence of the reality of the diffusion. We shall return to this doctrine of irrational association later, for the moment let us turn to the evidence offered for the existence of this Egyptian culture in various parts of the world.

In the previous chapter the facts in regard to mummification have been outlined, and their failure to corroborate the theory that the custom was diffused was, I hope, made clear. Space is lacking for a similar presentation or discussion in detail of the facts in the case of megalithic architecture and stone images, but a few significant points may be made and the actuality of their diffusion as a logical trait-complex briefly examined.

The megalithic problem is a large and very complicated one all by itself on which the opinions of the best authorities differ widely. The outstanding element in the problem is the origin and distribution of the dolmen and its derivative forms, the "passage grave" and *allées couvertes*. As is well known, a dolmen in its simplest form is a structure built of three or more large slabs of stone set on edge to form a small chamber, which is roofed with a capstone. To this there may be added two or more additional slabs with capstone to form an entrance passage. The whole was often, but not always, covered by an earth mound or tumulus. If the size of the chamber and the length of the passage increased, we have the "passage grave"; the disappearance of the chamber leaves us then with the third type, or *allées couvertes*. Structures of one or the other of these types were built along the Atlantic and Baltic shores of Europe in great numbers in neolithic and early bronze times. They are abundant in the Caucasus, in southern India, and in China and Japan. The problem arises as to their origin, and whether or not they are all to be attributed to a single culture of wide diffusion.

The origin of the megalithic structures is to be found, according to the heliolithic theory, in the Egyptian *mastaba* tombs, and this view has been upheld quite independently by some of the best students of European archæology, such as Montelius and Obermaier. The *mastaba* tomb, whose evolution has been traced historically by Reisner with great skill, reached its full development in Egypt in the Pyramid Age, but ceased to be constructed after the beginning of the Middle Empire, *i. e.*, toward the middle of the third millennium B. C. It was not strictly a tomb, for the body was buried in a deep vault lying below it, reached by a shaft. It might better be called a sort of mortuary or memorial chapel. It was always individual, *i. e.*, built for a single person.

Into the details of its plan and construction it is not necessary for us to enter, the significant point being that the *mastaba* is regarded by the theory as the prototype of the simple dolmen which was reached through a series of stages of progressive degeneration, such as the Giant's Tombs of Sardinia, the *allées couvertes*, etc. The theory thus seems to assume that the *mastaba* was brought by Egyptian voyagers to western Europe, whose barbarous populations copied it crudely in increasingly degenerate form. The scheme as presented in detail by Smith is very ingenious and convincing, but there is something to be said on the other side. First, as to dates. If the heliolithic culture-bringers did not leave Egypt until the ninth or eighth century B. C. one would hardly have expected them to introduce a type of tomb, *i. e.*, the *mastaba*, which had not been in use in Egypt for nearly fifteen hundred years. Moreover, if they only reached western Europe in the ninth or eighth century B. C., they would have arrived some fifteen hundred years too late to be the introducers of the degenerate *mastaba* tomb, since the earlier dolmens are dated toward the middle of the third millennium B. C. If we

shut our eyes to a little matter of a thousand years or two and suppose them to have come in the middle of the third millennium B. C., then they could not have brought anything but the bare nucleus of the heliolithic culture, which was not fully formed, in Smith's view, until the tenth century B. C.!

But the sequence of development of megalithic structures which the theory of their origin from the *mastaba* demands, is exactly the reverse of that established beyond question, at least for the Scandinavian region, and that which, from a study of the structures themselves, appears to be the more logical one. Further, if actual Egyptian immigrants reached western European shores, one would expect to find somewhere some true *mastabas*, of which the megalithic structures were supposed to be the degenerate copies. Not only, however, are none such known, but in none of the whole great series of megalithic sites investigated has any single object, even so much as a single bead, of Egyptian origin been found. Under these circumstances it is very difficult to see how direct Egyptian influence can be accepted. Lastly, there are two fundamental differences which sharply separate the megalithic structures from the *mastaba* tombs. The latter are, as previously stated, not tombs, for burials are never made in them; they are rather memorial chapels, residences for the ghosts, shrines for offerings and worship. They are also individual, built for one person only. Now the megalithic structures were, on the contrary, real tombs, the burial being directly within the chamber of the dolmen itself; and they were furthermore generally communal tombs, often containing a large number of burials. Quite apart, thus, from the other difficulties in the way of deriving the dolmen from the *mastaba*, these basic differences in character and purpose suffice to put them in another category.

If we turn to India and Japan the argument against the

interpretation of the historic sequence of forms required by the heliolithic theory is strengthened, and the chances of Egyptian influence being in any way responsible for them become, for Japan at least, almost impossible. For in China the development of the stone dolmen covered by its tumulus, out of a wooden prototype, can be clearly traced and, what is more to the point, dated. The subsequent development of the dolmen to the "passage grave" can also be seen. Since this development had certainly occurred in China¹ already by the ninth century B. C., and perhaps as early as the twelfth, it is obvious that the hypothetical bringers of the heliolithic culture, who did not set out from Egypt until the ninth century or later, could not have been responsible for it. The chronology is, however, not the only bar to the theory, since China in early Chou times (when this development took place) had relatively little contact with the seacoast, so that her inland culture would not have been likely to be so seriously influenced by questing Egyptian adventurers, even if they could have come. In Han times, about the beginning of the Christian era, the "passage-grave" type spread from China to Japan, and in this form and its later development as *allées couvertes* persisted there down to the seventh century A. D.

In India the whole question of megalithic structures is too large and still too little investigated to make any final conclusions possible. It can, however, be said with some certainty that the old accounts relied on by Smith, written a couple of generations ago, are largely misleading; that the variety of types and differences in culture represented among the enormous number of these structures in southern India will require long and skilled investigation, before the problem can be even outlined; and also, that although in a few instances where modern, scientific excavation has been

¹ Conrady, A., "Zu der Frage nach Alter und Herkunft der sog. Japanischen Dolmen," *Ostasiatische Zeitschrift*, vol. 4, pp. 229-247.

carried on, certain objects which recall Egyptian forms have been found, their resemblance is to the Egypt of the third millennium B. C. or to the still older pre-dynastic period extending back to the fifth millennium. Again, therefore, the whole theory of the heliolithic culture is wrecked on the simple facts of chronology, for it is the explicit opinion of the investigators¹ that, even if the rather dubious Egyptian analogies should be substantiated by further work, they are of such character as to point to indirect and not direct contacts, and mostly at a period antedating the inception of even the heliolithic nucleus by several thousand years. As evidence for Egyptian influence in India the theory also refers to resemblances between Dravidian temple forms and those typical of Theban temples. It is difficult to see wherein the appositeness of this suggestion lies, since the oldest known examples of Dravidian temples date only from the seventh century A. D., nearly fifteen hundred years after the Egyptian influence was explicitly stated by Smith to have reached India in complete form. It might also be noted that it is generally taken as an accepted fact, that Dravidian architecture is clearly derived from wooden prototypes.

A last word may be said as to the supposed eastward diffusion of megalithic structures across the Pacific to America. In Indonesia a few small and insignificant dolmen cists are known; in the New Hebrides in Melanesia, small dolmen-like stone altars (not tombs) have been reported; and in a single island of the Solomon group, Fox² has described small dolmen graves. Further eastward, however, anything of this sort is wholly unknown, and

¹ Hunt, E. H., "Hyderabad Cairn Burials and their Significance," *J. Roy. Anth. Inst.*, vol. 54, pp. 140-157.

² Fox, C. E., "The Threshold of the Pacific: An Account of the Social Organization, Magic and Religion of the People of San Cristoval." London and New York, 1925.

except for small stone-slab cists which have no necessary connection with dolmens at all, they are quite unknown in any part of America, North or South.

When megalithic structures of the type found in Europe and Asia are not to be found, the theory essays to fill the gap by pointing to the existence either of stepped-stone pyramids or to stone construction of any sort whatever, so long as it employs large pieces of stone. Space is lacking to discuss this aspect of the matter, but one may point out in passing that (1) the stepped-stone pyramid tombs in Tonga are now known to be local developments of older simple earth mounds, and to be but a few centuries old, (2) that all other stone construction in Polynesia and Micronesia is, at least in part, historic, and is so individualized in its character in each group, as to make it very probable that in each area where it occurs it is primarily a local growth, (3) that so far as South America is concerned, no stone pyramid construction occurs, the pyramidal structures being built of sun-dried adobe bricks, and (4) that so far as Middle America and Mexico are concerned, the pyramids were there designed as substructures for buildings rather than as tombs, that they were probably being built in this area before any hypothetical Egyptian influences leaving there in the eighth century B. C. and crossing the Pacific to Peru, could have reached the area. It is frequently asserted by followers of the heliolithic cult, as well as by others, that there is a direct connection between the pyramidal structures in Cambodia and the similar ones in the New World, but it is extraordinarily difficult to understand why such an obviously impossible statement should be made and continue to be made, in the face of easily ascertainable facts. In the Middle American area we have dated pyramidal structures going back to the second and third centuries A. D.; the oldest of the structures in Cambodia were not built until some five

or six hundred years later. It is difficult to derive a type of architecture flourishing in the second century from one not in existence until the eighth! Furthermore, the older Cambodian structures were built of brick, not of stone. There are a dozen other reasons why this suggestion of Cambodian influence in America is fantastic, but chronology alone absolutely rules it out.

In the previous chapter in dealing with mummification, we saw that for this particular trait there was no valid evidence which would lead us to derive the custom, wherever found, from an Egyptian source, nor to believe that as a trait it had been diffused across the Pacific. The same has now more briefly been shown to be the case for the dolmen and its associated megalithic structures. This is the second of the triad forming the nucleus of the heliolithic culture. Were space available a similar result could be shown in the case of the third trait, *i. e.*, stone images. None of the individual traits, thus, forming the nucleus of the heliolithic complex, gives evidence either of Egyptian origin or of a world-wide diffusion.

It is asserted by the theory that these three traits were "genetically related and intimately linked," so it should be inquired whether even this claim fits the facts of actual distribution. A brief scrutiny reveals that it does not. For Indonesia one finds dolmens reported with any certainty only from Celebes, Sumba, and Ceram, with uncertain instances in Timorlaut and the small islets between it and Timor and elsewhere. True mummification is known nowhere in the whole of Indonesia. It is very significant in this connection, where the mummification of the body for preservation is insisted on as a feature fundamentally associated with megalithic structures, that the only dolmens in Celebes referred to by Perry, contain *cremated* burials! It is hard to adjust this to the theory that megalithic structures were

brought by Egyptian wanderers practising mummification. Stone images are reported only from one spot in Sumatra, from Java, from Celebes, and an unspecified place in the Moluccas. In Indonesia, therefore, in no single case do all three of the traits occur together, and in only few cases do any two occur together. This would hardly be evidence of cultural correlation.

For Melanesia the situation is even worse, for only at two or three points, separated from the nearest Indonesian area by nearly two thousand miles, has anything that could reasonably be called a dolmen or any form of megalithic structure whatever been found. Stone images are known at a few points far removed as a rule from the above sites or any point where mummification is employed. It may be said that practically there are no cases whatever in Melanesia where two of the triad occur together. In Polynesia the correlation is slightly better, for although dolmens occur in but one case, and in three of the groups where other types of stone construction existed mummification was definitely absent, we do find stone images in association with mummification in the Marquesas, and with stone construction in Easter Island. In America the dolmen and its derivatives are wanting. Stone images and stone construction, however, occur together in Peru, Colombia, among the Maya, and in Mexico, but not in association with mummification.

The evidence for any significant correlation, indicating that these three traits are "genetically related and intimately linked," is not to be found; where there is correlation at all, it is so erratic as to be meaningless. We are asked to assume a stream of highly cultured adventurers, passing eastward across the Pacific and introducing their culture complex (or at least its nucleus) among the backward peoples along the way. For three or four thousand miles of their route—through Indonesia and Melanesia—the indi-

vidual traits themselves are only rarely found and nowhere do we find a spot where the three occur together. Then, as we go further away from the supposed source of inspiration, the frequency with which some form of the traits occurs increases, and they are found singly or paired, now this way and now that, with one single case—the Marquesas—where all three were known. If we add to the nucleus the adventitious other traits forming the whole complex, and trace all these, the confusion only becomes worse confounded, for here one trait drops out, and there another, only to reappear again thousands of miles farther on. It is the same situation which we encountered in the culture-strata theory, and here, as there, the explanation is that there is no correlation and consequently no logical nor even accidental complex; both are illusions.

But, it may be objected, although such an erratic, uncorrelated distribution is incompatible with any theory of continuous diffusion, we are here dealing with something else. For the theory expressly states that the heliolithic complex was distributed by groups of adventurous sea-wanderers, who, sailing ever eastward from their Egyptian home, were living examples of this culture, offering it to the uncouth peoples whom they met. It was not continuous, but discontinuous diffusion, which took place. The barbarous folk took from the store of culture which the adventurers exemplified, what pleased them only; the culture-carriers bore the undiminished store with them to the end. At every point along the way the varying environments, the varying conservatisms, the varying culture patterns of the people determined what they chose. The erratic distribution, the lack of correlation is therefore wholly explained; it is precisely what the principles of diffusion outlined here would lead us to expect!

All this might be granted if the conditions precedent

could exist—but they could not! For to render possible the process of selective borrowing, of discontinuous diffusion suggested, one and the same group of culture-carriers must in their single lifetime have completed the stupendous journey, questing from Egypt along the Asiatic shores, flitting from island to island across the whole Pacific, and so on northward to lay their weary bones at last upon the Mexican plateau. I doubt if even the most ardent upholders of the heliolithic theory would venture to suggest that anything of this sort could have occurred. But if it did not, then the theory must squarely face a dilemma. For then, either the culture-carriers were a single band who, drifting slowly eastward, settled for a time now here, now there, and dying, intrusted the continuance of the journey and the civilizing task to their descendants, so that generations elapsed in their eight-thousand-mile spread; or successive groups must have left the Egyptian homeland, settling ever farther and farther along the road already colonized by their predecessors, until the valley of Mexico was reached.

And on either of the horns the theory can not fail to be impaled! For each alternative requires time, not generations only but centuries, and time inevitably produces changes, progressive changes not alternating ones. Each, also, brings in the influences which differing environments inevitably exert, influences which again must lead to change. So the accidental, fortuitous culture complex which set out from Egypt could not survive unscathed the widely varying environments nor yet the centuries during which it would be under way. And here we come to the crucial point, already touched upon above, for these inevitable changes *must* be both cumulative and continuous in direction, and traits lost could not resurrect themselves again generations later and thousands of miles farther on. *If* a heliolithic

culture had been brought to the areas concerned in either of the two ways by which alone it was possible, then the distribution of its traits must have been radically different from what it is. The inference is apparently inescapable. One last point, and we may leave this aspect of the argument. If the dissemination took place in either of the ways which seem physically possible, then either the original group and its immediate descendants or the successive bands of colonists, must have stayed long enough here and there along the way to have left remains which should show not degenerate or crude copies of the traits, which their barbarous imitators might be expected to achieve, but full, clear examples of their Egyptian heritage. Somewhere in all this vast area one ought to find a real *mastaba* tomb, a pylon, a lotus capital, a typical hieroglyphic inscription, a single glass bead, or bit of characteristic jewelry. Yet nowhere has anything whatever of Egyptian type or origin been found.

Lastly, we have discussed in a previous connection the practical difficulties in the way of crediting that Polynesians, wonderful navigators though they were, could have crossed the great stretch of four thousand miles of open sea between their eastern limits and the South American shore. Yet the heliolithic theory asks more of us than that. It asks us to believe that at a period when the Phœnicians, the most daring sailors, adventurers and traders of the ancient world, still hugged the coast-line or at best dared cross but a few hundred miles of open sea, the Egyptians, never a real maritime folk, or some unnamed Somali peoples, among whom we have no evidence that Egyptian culture ever prevailed, showed a daring and a seamanship unknown throughout the world until the time of Columbus two thousand years afterward. It demands of them a vision and an ideal, incredible alike for the people and for

the times, and a purpose as unfathomable as their persistence would have been unparalleled, in pushing blindly on for centuries into the unknown. It demands in a word the impossible!

If the heliolithic theory, as propounded by Elliot Smith, verges on the impossible, its later amplification by his disciple Perry¹ passes even these bounds, and enters into the realm of fantasy. If the data submitted in evidence and the arguments advanced were in the one case tenuous and not in accord with known experience, those in the other are in large measure misleading or even false and illogical. These are grave charges, but their truth is unfortunately demonstrable by even the briefest study of the facts. To cover the whole range of material and argument, which have been collected with great labor and presented with some skill in favor of the theory, would require a volume in itself.

A brief survey of a single step in the argument will, however, serve as a sample of the whole. After having shown, as I believe, the impossibility of the original theory, it may seem a work of supererogation to devote further space to an amplification of it. I venture to do so because it has been presented to a larger audience, and little effective criticism that I know of has yet been made.

The theory starts by declaring that the culture of all the older peoples of the world who had attained the rank of food-producers (*i. e.*, agriculturists) as compared with food-gatherers (pure hunting and fishing peoples) was everywhere throughout the world substantially alike. This culture, said to be common to all but the most primitive folk, is called the Archaic Culture, and declared to have been derived from Egypt. Everywhere, it is claimed, we find the older peoples possessing a higher culture than their modern descendants, so that from the high level of the Archaic

¹ Perry, W. J., *op. cit.*

Culture man has everywhere degenerated, both in time and space, for the peoples far away from the cultural foci formed by the colonies of the Egyptian archaic culture received it only in diluted and degenerate form.

The underlying cause of the spread of the Archaic Culture from Egypt was the search for gold and pearls and various so-called "life-giving substances," which in Egypt were thought to possess a magical potency and which the Egyptians thus always eagerly sought. The theory also asserts that if we subtract from the culture of the food-gatherers what they have learned from the food-producers (who brought the culture from Egypt), these unfortunate folk "are practically devoid of arts and crafts." Here is the first plain statement of fact, and one whose falsity is apparent on the surface, for it denies, let us say, to the Eskimo any "arts and crafts"! A moment's consideration shows the absurdity of the statement, for to refer only to two points out of many, it could hardly be claimed that the skin kayak or the snow house were attributable to Egyptian culture!

Proceeding, the theory expressly limits the area to be considered in North America by excluding the whole Pacific coast region north of California, the Eskimo, and the tribes of the Plains. It requires no very expert knowledge of the culture and culture history of the American Indian to have a shrewd suspicion why—the cultures found in those portions of the continent cannot even be dragooned into fitting the theory! The reason alleged in the case of the first two—that they show signs of affiliation with the culture of northeastern Asia—has actually no real bearing on the case. That given as ground for the elimination of the Plains tribes—that they migrated into the Plains after the introduction of the horse by the Spanish—is not only for most of the tribes not true, but is put forward solely on the

authority of Wissler,¹ who, however, in the article referred to, explicitly states that subsequent to the introduction of the horse *no* migrations of consequence occurred!

The distinction between the cultures of the food-producers in North America and the food-gatherers is next stated to be "abrupt," and the sharp line between the Pueblo culture and that of the Indians of California is declared to be an example in point. Actually there is between the Pueblo culture and that typical of the Indians of central California a very long and gradual transition, one so striking that it is one of the most effective illustrations in the continent of the slow modification of cultural characteristics. The transitions in house types, in agricultural development, and in pottery-making, to cite three of the four features explicitly referred to, are clear. In the fourth, metal-working, any transition is indeed lacking, for the excellent reason that all knowledge of it was absent in both areas! It is suggested that environment cannot be responsible for the supposed sudden cultural change, yet actually it is just this factor of changing environment that can be shown to be perhaps the primary efficient cause of the striking and gradual change.

The source of agriculture, the trait which differentiates the food-producers from the food-gatherers, is next sought. It is stated that maize agriculture is everywhere uniform and that the same varieties were grown and the same methods of planting, fertilizing, and cooking prevailed everywhere. Actually this is far from the fact, since the local use of particular varieties and local methods of preparation and cooking are only too well known. Following the evidence of the Mexican origin of maize, and accepting the spread of the agriculture-pottery complex as demonstrated,

¹ Wissler, C., "The Influence of the Horse in the Development of Plains Culture," *American Anthropologist* (N. S.), vol. 16, pp. 1-25.

the theory then with no further investigation of any of the innumerable other traits of their culture, leaps to the conclusion that, since the two traits of agriculture and pottery-making were derived from Mexico, therefore *all* the rest of the culture of *all* the food-producing tribes in North America was drawn from the same source. The validity of the reasoning hardly requires comment.

Attention is next directed to the Mound-Builders, and the conclusion that the custom of building mounds "came from Mexico" is said to be "fairly certain." It is doubtful whether those who to-day are familiar with the results of the archæological investigations of the last forty years in this field would wholly agree with this view. A megalithic tinge is given to the mound-building people by reference to "dolmen-like burial chambers made of large slabs" as occurring in some of the mounds. The statement rests on the discovery in a single mound of a small vault, the walls being built up of small rough slabs of stone, laid horizontally as in building a wall, not set vertically as in all dolmens, the roof "seeming" to have been formed by a large slab of stone. As unroofed, walled enclosures are found characteristically in this particular region, it is probable that this one was of similar type. But under any circumstances it was not in any sense a dolmen, and the suggestion implied that the mound-building tribes had megalithic culture is utterly baseless.

On the basis that gold and silver were in use among the tribes of Mexico and not by the tribes farther north, these are declared to be degenerate. Mexican agriculture was based, it is said, on irrigation and this, too, was unknown to the tribes of the mound area, so that here again they are called "degenerate." The argument is rather naïve, since it fails to take into consideration the extremely obvious fact that although irrigation is essential in an arid or semiarid

region such as upland Mexico, it is quite unnecessary in the well-watered area in which the mounds are located. As irrigation is not in use in England, the same argument would make the English "degenerate." It is by depending on this sort of evidence, that a degenerative culture sequence is assumed, starting with Mexico and ranging through the mound-building tribes to the historic Indians of eastern North America.

Turning next to the Pueblo area the author notes that here irrigation was in use, but then makes the extraordinary statement that the introduction of the horse by the Spanish led some of the Pueblo peoples to abandon settled agriculture and take up a nomadic life, this "degenerate" group being represented by the Navaho and Apache! To any one with the most rudimentary knowledge of the tribes and cultures of the Southwest such a statement is absurd, for the Navaho and Apache were nomad, hunting tribes before the Spanish appeared, and not sedentary, agricultural peoples. The introduction of the sheep led the former to become pastoralists, instead of hunters with a little crude agriculture picked up from Pueblo contacts.

By such means another degeneration sequence is made out, and since the Pueblo tribes grew corn, and corn was derived from Mexico, therefore the whole of Pueblo culture is declared to have been derived thence as well. It is disheartening after there has been half a century almost of painstaking investigation of the culture and archæology of the Southwest to find belief in its Mexican origin still extant. The whole mass of accumulated data, cultural and archæological alike, speaks against it; and those who, by virtue of their wide knowledge of the field are competent to judge, have reiterated in numerous publications the evidence for the primarily local origin of the culture.

Having asserted, in the face of contradictory facts, the

origin of all North American culture from Mexico, attention is turned to that area. It is pointed out that the Aztecs were late comers in the region, and that back of them lay the Toltecs, whose culture is said to be the oldest there. The abundant results of the last generation's archæological investigations in Mexico are thus completely ignored, with all the data on the much older pre-Toltec culture generally known as the "archaic," but not to be confused with any pseudo-Egyptian complex. The affiliation of Toltec culture with the Maya is accepted, the higher status of the older Maya over the later stressed, and thus again a cultural degeneration sequence established, leading us to the early Maya, as the *fons et origo* of all North American civilization.

Here then at the fountain-head we should find the basic traits of that "Archaic Culture" brought from Egypt, and find them in a perfection of development superior to the more marginal areas, where this imported culture degenerated stage by stage. This, by the theory, was the source for all the other cultures, starting with Yucatan and Mexico which "in their turn sent out shoots" which influenced the regions beyond. "In time these new civilizations in their turn degenerated . . . and the final upshot was to produce communities of a low level of culture. . . . The tale is one of uninterrupted culture degeneration."¹

We are asked then to note that this high culture of the Old Maya has no beginning; it appears suddenly full-blown in one small area, and thereafter it and its offshoots pursue a steadily down-hill course. There can be but one explanation in the view of this theory and that is that this Old Maya culture was not of local origin, it must have been introduced, brought by those "Children of the Sun" who bore this precious heritage with them across the seas from

¹ Perry, W. J., *op. cit.*, p. 18.

Egypt, where in the third millennium B. C. it had had its rise.

It is true we have not yet fully explained the beginnings of the extraordinary culture which the Old Maya possessed. But as yet scientific archæological exploration of the Maya area is still in its infancy, and in that portion where the Old Maya culture is best developed has hardly even begun. It is therefore not surprising that much of the unravelling of the problem of its origin lies still before us. It is pertinent to remember that Egyptian civilization, from which this theory would derive so much in the New World, was in precisely the same situation only a few decades ago. Then, through the explorations of a group of brilliant and able archæologists, the whole immense vista of pre-Dynastic Egypt was opened up, and now we can trace with quite amazing detail the rise and slow development across the centuries of the great civilization that fifty years ago seemed to have been born full-grown.

But what are those basic traits which the Old Maya, and the cultures most closely connected with them, possessed, and which were thus marked off from the other less fortunate tribes in the continent? They are stated to be as follows: (1) the use of stone for purposes of construction, (2) irrigation, (3) sculpture, especially of stone images, and (4) metallurgy, especially of the precious metals. But will the distinction hold? In not a single case. If there was one trait which marked the sedentary Indian tribes of the Southwest, it was their use of stone in building, and to it the hundreds of ruined sites, and the many occupied sites bear witness. The greatest development of irrigation that we know in North America was in Arizona, and the Maya, who are said to possess the trait in appropriately high degree, actually lacked it entirely! Although sculpture in stone certainly did reach its highest

achievement among the Maya and was fairly well developed in Mexico, it was not by any means unknown farther north. For various peoples, running as far as the Eskimo, were skilled in sculpture of small figures either of stone or bone or ivory, and on the Pacific coast, from the Columbia River northward, sculpture on a large scale in wood was highly developed. Lastly, metal-working was among the Maya but meagrely developed on the whole, and gold in particular was scarce. The greatest use of metals in the region was in Mexico, where at least, so far as bronze was concerned, the indications are very clear that it was introduced by trade from South America. Thus of the four basic traits that the Maya should possess in fullest measure, two were wholly or partially lacking, whereas one of the others was also present in greater or smaller measure among those tribes beyond the pale, to whom the civilizing germs of Egyptian culture are expressly denied.

The result of this tedious survey of the first short step in the presentation of the theory is hardly conducive to faith in its conclusions. Were we to follow the argument through all its dreary length, the outcome, step by step, would be found to be equally or even more unconvincing. Throughout one finds statements for which there is no foundation, coupled with the neglect of pertinent and easily ascertainable facts, and a reasoning which shows a fantasy of imagination ill suited to the elucidation of the very intricate and puzzling problem of culture origins and growth. It is only with reluctance that so harsh an opinion is expressed, but no impartial checking of the theory against the facts can fail to corroborate it.

The problems of the origin and development of American cultures, or any cultures or of human culture as a whole, are not to be thus easily solved. Where parallels appear to exist, it is easy to turn to diffusion to explain them, and

when concrete evidence for diffusion is lacking, it is tempting to leap the gap and charge to "lost arts" the missing links. If wide seas obtrude, they may be crossed by intrepid sailors in voyages of a kind unimagined so far as we know until thousands of years later. No, the questions will be answered by less easy means than these. By the slow labor of the archæologist who pieces together the history and reconstructs the actual culture sequences, now of this area, now of that; by the tedious task of the ethnologist who bit by bit traces out the growth and spread of one custom or belief or craft after another; by the physical anthropologist who works out by patient measurement the racial groups involved; by the sane and careful work of the linguistic students who establish, through language, links between remote peoples. Only from such trusty and well-tested materials and with due reference to principles of cultural growth and spread, derived from the study of concrete cases, can we hope to reach the truth.

CHAPTER VIII

THE BUILDING OF CULTURES

IN the preceding chapters we have been mainly concerned with the units of culture, those traits and trait-complexes of which the whole culture of any given people is composed. We first considered the significance of environment and the character and limits of its influence upon cultural traits. Since obviously every trait must have been discovered or invented somewhere at least once, this study was followed by an inquiry in regard to the phenomena of discovery and invention which thus clearly lay at the bottom of the whole question of culture origins. Having discussed the origin of traits, we next attempted to follow them in time and space as they grew old within the area of their birth and as, by the process of diffusion, they spread first among neighboring peoples and then farther and farther over the world. With the experience gained from a study of concrete examples of diffusion, we then approached the problems presented by the existence of cultural parallels in widely separated areas, and sought to apply to these the principles gained from the previous study, as well as those of common sense. Lastly, we have examined two of the recent theories which, pinning their faith solely to the process of diffusion, have endeavored to explain the maze of varied cultures as due to the world-wide wanderings of groups of people who each carried with them a characteristic culture complex. These theories we found on examination we could not accept as they rested on too precarious a basis of established fact, and outraged not only the prin-

ciples of diffusion just established, but also the dictates of common sense.

We are at last, then, in a position to approach the whole subject from the opposite angle, considering not the individual trait or trait-complex, but the culture of a people as a whole. We are ready, in other words, to discuss the building of cultures; to see whether, basing ourselves on the results of the whole previous investigation, we can reconstruct the process by which any individual culture has come to be what it is; to draw any valid conclusions which we may, with reference to the lines of development of culture as a whole; and, finally from our knowledge of the past, to offer suggestions as to the future.

We may start by noting that every people has its home, its own peculiar combination of environmental conditions. By and large, the majority of peoples have been long resident, so far as we can tell, within the region in which we know them to-day. It is true that there are many exceptions, peoples who have migrated widely and passed from one environment to another. For such shifting of environment due allowance must be made. For the moment, however, we may leave these cases aside, and confine ourselves to a more typical group which has lived in its present surroundings for many centuries or even thousands of years.

The basic needs of any such group—food, clothing, shelter, transport, and many implements—are determined and in some measure limited by its environment, and a considerable proportion of the specific traits of culture which mark it, is likely to have been discovered, invented, or developed by the men of genius of the group. But not all; for, however long the group may have lived within its present territory, there must have been a time when its first members reached it in the slow process of the peopling of

the globe. Either, then, in that early day when the virgin world was being first won for man or at some later time, the ancestors of the group arrived. Culture of some sort they brought with them, for otherwise they would not have been men. And this culture was one whose traits had been discovered and invented in the habitat from which they came.

The culture brought by the first immigrants must have been simple, and composed of traits so universal, so basic, so essential to man as man, that they represent the first stage or stages of the long advance which has raised man so high above the brutes. In early palæolithic times some scores of thousands of years ago, the world's first pioneers, as they fared forth over the Old World from some centre or centres perhaps in Eurasia, could have carried with them to their new habitats but meagre cultural baggage. Perhaps man spread quite widely at the very first, possessed only of the barest minimum of traits to raise him above his fellow brutes. If so, then the common foundation with which all separate cultures began was very small, and differentiation according to environment began almost at the beginning. On the whole, it seems more likely on the evidence that we have, that no very wide dispersion was attained at first, and that only when a modest but still very primitive stage of culture had been attained did man set out to win the world. And this for the reason also that it was in no small measure due to man's possession of a minimum culture that he was able, as other animals were not, to spread into environments from which otherwise he would have been barred.

Opinions must differ widely as to what traits are likely to have been included in this true Archaic Culture which formed the common heritage, but however small it was—a knowledge of fire, of flaking stone, the use of skins, of a

few rude implements of stone and bone and wood—this, at least, if no more, must have been carried by the early population as it spread. Upon this little store, as any group moved farther and farther on its way, new needs and changing environment began to work, leading to the deriving of a new expedient here, an improvement there, or perhaps a discarding of something from the store which had become an impediment rather than an advantage. New animals with new habits require new or improved means to hunt them; a colder climate demands garments giving greater protection, or a warmer may lead to discarding of protective body-covering as now no longer needed. From the beginning, thus, environment and those needs that rest in some measure upon it, began to mould the little group of traits and add to it, as man spread. We do not know, we probably cannot know, the precise routes by which these earlier adventurous groups reached the destinations where they decided to settle down, or stopped for generations or centuries before continuing on their way. We do not know how long their journeys lasted, nor how long they may have tarried here or there, but, sooner or later, after varying vicissitudes and bringing their modified and increased store of culture with them, they came to an area where they stopped and where their descendants live to-day.

Each group that wandered away from the parent stock and whose descendants came thus to rest in some haven, had shared in the common heritage, but each, in its drifting, had differing conditions to meet, so that, when it came to rest at last, each had developed a measure of individuality. In other words, the original primitive group, possessed of a common fund of simple culture, differentiated as it expanded, this differentiation being greatest at the margins where it was subjected to the greatest environmental changes.

When, in the course of this expansion, a group came to rest in any area for a long period, its culture fell under the sway of that environment and to the conditions of this environment the culture had more or less successfully to be adjusted. The more individual and clear-cut the environment, the more specialized and dependent on it the adaptations and inventions are likely to be; and the greater the genius and ability of the group, the more complete the adjustment and the more quickly will it be likely to be attained. Different groups coming to live in separate although generally similar environments may, with similar needs, hit upon similar, if not identical, means of satisfying them. Whether they will do so or not depends upon chance and their past history.

So, little by little, on the heritage of culture that they brought, the group will build up the basis of their culture, which will be correlated more or less closely with their environment, and will have arisen in large measure out of it. As far as it extends, this correlation applies in the main to the material side of culture, although the non-material is not exempt, for it is variously and subtly affected. The non-material traits arise and are modified partly under the influence of the environment thus, but more as a result of the group's history and its individual mentality. Such parallelisms as develop are due to the relatively limited number of fundamentally different possibilities which exist or are the consequence of convergent development.

These traits so derived, both material and non-material, form, however, but a portion of a people's culture; they are the foundation, the warp of the cultural fabric, for which exotic traits derived by diffusion supply the weft. In the course of their journeyings before they reached their settled habitat, diffusion must already have brought them traits from other groups, so that the process of blending

local and exotic elements must have begun very early. And once they come to rest and begin the slow building of the broader foundation of their culture through adaptation to the new conditions, the currents of diffusion continue to bring them traits which have arisen under alien skies. These currents may be of two sorts, those, on the one hand, which are so to speak centrifugal, spreading out from the old home land or nucleus of the expanding population, and, on the other, those which flow out from new foci nearer the margins, *i. e.*, from each of the increasingly individualistic cultures to which changed conditions have given rise. In the old nuclear area where the expansion of population began culture does not stand still. Common inheritors with their now far-wandered offshoots, they, too, build on the same ultimate foundation their own superstructure of more perfectly adapted, improved, or newly invented traits, and this mother-culture, more and more specialized and elaborated, spreads outward toward its descendants. Their slowly fading heritage was from the older, common stock, so that in part the traits thus brought to them are outgrowths of this under ancestral skies, and "though their skies are changed above them," the descendants may receive these traits the more readily because of the ancient basis which has not been wholly lost. But only if the descendants have not wandered too far, for if their new conditions of life are strongly differentiated, the old traits in their newer guise may no longer appeal. So time and increasing specialization and adaptation loosen the bond, distance and differing environment weaken the stream of diffusion, until the remoter descendants pass finally beyond its influence.

But the weakening influence of the ancestral nucleus is more than made up for by the increasing number and strength of the streams of diffusion bringing to them traits from their neighbors and more distant foci elsewhere. How

numerous and how strong these influences are depends upon a series of geographical, topographical, and historical factors, to some of which we shall revert later. The point to be stressed here is that traits derived from these sources are widely varied, since they have arisen under wholly differing conditions of life and as the result of widely differing experience.

To any people, thus, there comes a greater or lesser wealth of such varied, exotic traits, which may be adopted or fail of adoption, or may serve merely as stimuli to special local development according as circumstances may decree. And of these two sets of elements—exotic traits brought by diffusion and local traits arising either out of their cultural heritage by adaptation or discovered and invented by their own genius and correlated in some degree often with their environment—of these two elements the fabric of a people's culture is woven. The foundation or warp comes from within, the exotic elements or weft, from without; the warp is static in that it is tied in some measure to the environment, the weft is dynamic, mobile, drifting along diffusion lines. The textile analogy may indeed be carried further with profit. For, if the environment of a people be strongly marked, the warp, the basic traits of their culture that are correlated in some degree with environment, will tend also to be sharply defined; and if the weft, the exotic traits which come to them, are few and weak, the warp will stand out in their culture, ribbed and strong as in a rep. So in the case of the Eskimo, the traits based on the very clearly defined environment stand out sharply, there being little in the way of exotic elements which have reached this isolated group. Where, on the other hand, the environment lacks strong individuality so that the basic traits are relatively undistinguished, whereas the exotic traits supplied by diffusion are many and strik-

ing, then the weft element may come to overlay the warp and largely conceal it, as in a satin. So in Cambodia in the ninth and tenth centuries, the local culture of a more or less generalized and widely spread type was so overlaid by Indian culture elements as to be relatively inconspicuous.

There is some reason, moreover, to believe that very often the strength of a culture, its virility and energy, and even its vitality, depend in no small measure on the tenacity of its environmental fibre, as does its richness and brilliance on the number and variety of exotic traits which it contains. The tenacity and enduring character, for example, of the culture of the Southwest and the strong influences which it diffused, rest in no small degree on the individuality of its environment. So the strength and long vitality of Egyptian culture may be traced to the sharply defined and almost unique nature of its habitat. Greek culture, on the other hand, owed much of its richness to its wider contacts which brought it a greater wealth of exotic traits.

And here comes in a factor of great importance, that of geographic position. For peoples so located as to be accessible to the great currents of diffusion, are those to whom the opportunity comes to profit by the exotic traits they bring, whereas those whom fate has isolated far from these fertilizing streams receive little or nothing of their enriching flood. To Greece came in one way or another all the rich influences of the ancient world, which, quickening the Cretan heritage that had been grafted on a virile stock, gave birth to one of the richest cultures of all time. But to the Lapp or Chukchi in the frozen north, to the peoples in the far-off islands of the South Seas, there came nothing or but the faintest echo of all this. Their remoteness and their environment were against them, and for their cultures they were forced to draw mainly on their local resources.

To the marginal peoples of the world, diffusion atten-

uated by distance and passage through many intervening areas, could bring but a fraction of the riches it brought to more central and accessible groups. On the margins, too, opportunities were fewer, population was more sparse, and local inventions often more limited. To those again who were barred and isolated by sharp environmental or cultural contrasts, diffusion might offer but meagre aid. Both alike have been doomed to lowly civilization. The arctic peoples on the one hand, the Bushmen, Fuegians, and Tasmanians on the other, peoples in the outposts of the world, all have profited practically nothing from the discoveries and inventions of the greater civilizations which have influenced others in some degree. The rigor of an arctic environment or the barriers of desert and sea which lay between them and their more favored neighbors kept them in an isolation which, in the case of the Tasmanians, reached its utmost limit. For prisoned behind the waterless, sun-scorched wastes of Australia, and ringed in addition by the sea, they were beyond the reach of aid.

And here the significance of the geographic position of the New World makes itself felt. The Old World—Eurasia and Africa and the long looped archipelagoes and continental islands of the Pacific—forms one great unit, linked all through the tropics in a belt along which, from end to end, peoples and cultures have been free to drift at will. Throughout this vast area diffusion has been free to distribute as it might, inventions and discoveries wherever made, and here on every hand its influence may be seen. Here, until the verge was reached, were no impassable seas; no deserts that could not be passed around; no barriers that man and his culture has not passed and repassed, sometimes again and again. Here the rise of Rome to greatness could enrich the silk-merchants of far-off China; send Roman guards to add brilliance to the courts of South Indian kings;

build Roman baths in Britain; make Egypt and the Nile pay tribute; and, arousing the avarice of the northern hordes around the Baltic, lead them to move southward for plunder and ultimate conquest. But behind its barriers of three thousand miles or more of open sea the New World lay immune, inviolate.

Nearing the Old World only in the frozen north, all immigrants and drifting culture traits which reached it by way of Bering Strait were forced to pass an arctic barrier so that, in northeastern Asia and Alaska, traits born in more favored climes met their severest test. And this arctic threshold must have proved too much for many if not for most. How could the textile art, dependent on plants and animals that did not and could not live in this environment, pass through this ice-bound gate, whose keepers needed skins, not cloth, to keep out the biting cold? Or agriculture or a score of other traits? The bars erected by this grimmest of environments were rigid and close set, and let but little filter through. On all the immigrants who passed this way, therefore, the north set its seal and from all it took much of their inheritance. Those who won through from time to time had to begin life anew, and rewin their fortune from the New World's virgin soil. This explains, I believe, in part, the fact long recognized that culture in the New World lagged behind that in the Old. How could it but be so when the hard-won advances made in the Old World had to be surrendered as the price of entry? In the Old World a discovery or invention made, an advance achieved in any field of culture, could be preserved and by diffusion saved from loss. Culture was accumulated, treasured as a precious thing, and formed, so to speak, a fund which by investment and reinvestment now in this people, now in that, grew with the centuries. The earliest immigrants to reach the New World had won little in the Old, perhaps, that they

could not take with them, but later drifts, although starting with a greater wealth, were stripped by the robber north and came on the New World stage not as culture bearers, as "Children of the Sun" bringing the light of civilization to a savage world, but rather as hordes of northern barbarians, coming to plunder, destroy, and only later to rise to the level of their predecessors. The flame of culture in Europe that had been burning brightly for more than a thousand years, was dimmed but not quenched for the centuries of the Dark Ages, in part as a result of the human torrents from the north. Yet the uncouth but virile barbarians after a respite took up the torch, which, rekindled by the Renaissance, they have helped to carry on. On a smaller scale and for stakes less great, the same drama must have been played out on the New World stage. Achievements won by the first pioneers were plundered from them by newcomers who, later assimilating what they had not destroyed, again forged ahead.

It is clear, thus, that geographic position plays a very large part in making possible the growth, and in determining the richness of culture. Another factor of great importance is that of density of population. For if a people is located in an environment which can support a dense population, then, as we have seen, with increasing numbers a multiplication of needs arises, which leads to an increase of inventions, and since these in some measure reflect the opportunities offered by the environment, they serve to strengthen the fibre of the people's culture. So that when a people are doubly fortunate in having an environment which will allow them to grow great in numbers, and at the same time are so placed that to them come varied streams of diffusion, we have at hand the conditions for the development of a great and rich civilization. How far these conditions apply to the oldest civilizations that we know, those

of Egypt and Mesopotamia, it is still too early to say. In both, the first condition was obviously present and the evidence of the appearance in the former of new racial contacts in the direction of Asia Minor at the beginning of the dynastic period, and of some vaguely understood connection with Mesopotamia, suggest that if we but had the history of the early beginnings, we should find diffusion had also played its part. For Mesopotamia the growing evidences of the blending of cultures in the very early period, and the possible relations with the newly discovered culture in the Indus Valley, suggest the same. For Minoan civilization there are clear indications of the mingling of several cultural streams, and the same is becoming more and more probable for China as well. For Greece and Rome the evidence is clear, and for India, at least, the historic culture owed not a little to its contacts with the West. For the New World, our knowledge of the beginnings of Mexican, Mayan, and Peruvian cultures is also still too incomplete to enable us to speak with certainty. We know, however, that for Mexico, at least, the influence of Mayan culture in the early period is assured, and some indications of influences also from Peru are coming to light. In Peru itself, the suggestions of some kind of diffusion from the Maya area and its blending with local cultures are growing more probable.

But the opportunity for the support of a considerable population and for the acquisition of exotic traits, is not in itself sufficient to insure the rise of a rich culture. There is needed also that factor of appreciation and imagination, of genius in other words, without which the traits themselves may not be adopted. Greek culture would not have attained the richness that it did, had not the vigor and imaginative power of the Greek mind, galvanized with new life the elements which diffusion brought to Greek shores, and combined them in a new synthesis with those derived from the opportunities which their own environment supplied. And if to the fabric

of culture, environment may give the strength, and diffusion bringing in exotic traits give richness, it is the genius and intellectual quality of a people which in the main decrees its pattern. The store of culture on which Rome drew was not so very different from that which had been open to Greece, yet the pattern of her culture was wholly different. Every nation in Europe to-day has contributed to and drawn from the same great fund of modern culture, yet each has built the traits it made and took into a pattern of its own.

We have seen that marginal peoples, those whom fate has placed in the far corners of the world, seem foredoomed to cultural poverty. But here, for peoples as for individuals, the factor of ability, of genius, of intellectual fibre enters in. For, just as a man, born in poverty and destitute of advantages may, if he have the ability and the mettle, rise above these obstacles, seize opportunity, and achieve success, so may a whole people. And, as a man, although poor in material things, may yet become a great leader, so may a whole people. The little group of poor Semitic nomads who, as the Hebrews, fought their way into tiny Palestine and settled on its rocky hills, wrung from this hard environment a culture poor indeed in material things, but so rich in thought and in its conception of life, that it has profoundly influenced the history of the world. The little clan of the Inca, from their high, cup-like valley of Cuzco, hemmed in by forest and bleak *paramo*, reached out and grasped an empire almost as great in extent as that of Rome, and evolved a scheme of government which almost completely realized the socialist Utopia, not dreamed of in Europe for many a hundred years. The Japanese in their rocky archipelago took in the seventh century of the best that China had to offer and rebuilt their culture on a higher plane; and then in the nineteenth century reached half-way around the world to Europe and did the same thing again.

In studying the phenomena of culture growth we have

tried to trace on the one hand how cultural traits arose, and the way in which single traits or trait-complexes spread over the world. On the other we have tried to show how, by the combination of traits of purely local origin with those supplied by diffusion, a people builds up that totality of implements and processes, of custom and ideas which is their civilization. And we have seen how such cultures thus complexly derived, varied in strength and richness, in part by virtue of their position, in part as a consequence of their genius. But one aspect of the problem we have touched but slightly, that of the power of these cultures to spread their significant features, by diffusion, far and wide. For cultures seem to differ in the dynamic quality with which they endow their traits. Some with abundant vigor have poured out their influences for centuries and diffused many of their characteristics half-way around the world, whereas others of feebler fibre have filled, as it were, only their own basins, and sent out no streams to aid the blossoming of other fields. Like individuals, some cultures are spendthrifts, some are misers. Egypt and China absorbed and hoarded culture without greatly influencing the world at large; Greece flung away her riches with both hands, and, although she died impoverished, the streams which flowed from her, still water the gardens of half the world.

The great cultures of the world's history, in the majority of cases, attained their commanding station largely because a gifted people had the chance to become numerous in a location favorably placed to receive the benefits of diffusion. But something more was needed as a rule—a habitat where nature was not too kind. For where environment supplies the ordinary human wants with little labor, the urge of need does not seem enough to lead to great achievement. A "Happy Valley" has rarely bred an outstanding culture; in the Gardens of the Hesperides, man drowsed the centuries

away. Most of the great cultures of the past had their rise in regions where, on the borders of a harsh environment, keen and persistent effort insured a rich reward. In Egypt, in Mesopotamia, in China and in India, it was in the irrigable lands along the desert borders that the cultures got their start; in the New World the Pueblo, Mexican, and Peruvian cultures were not unsimilarly placed.

Thus far in our discussion we have sought only to trace out the lines of cultural growth, and have only alluded to the possibility of retrogression in speaking of "lost arts." As outlined here the normal trend of culture is always onward, through increments of new discovery and invention and the absorption of exotic traits. That this is true in the majority of cases, the historical and archæological records seem to prove. But there are those for whom the Golden Age lies always in the past, and who see on every hand only the degenerate remnants of a once higher culture. So Perry, whose amplification of the heliolithic theory has already been discussed, sees in his Archaic Culture, developed in Egypt some five thousand years ago, the high point of cultural achievement from which the bulk of the world's population has since steadily fallen away. But although so extreme a view has little or nothing to offer in proof, degeneration in culture has obviously often taken place. Most frequently, perhaps, it is a phenomenon which applies more to small groups than whole peoples, or to certain aspects of a culture rather than to the culture as a whole. The fringes of a population forced by growing density of population to occupy poorer lands; conquered communities oppressed by victorious groups; or fugitives seeking refuge in areas hitherto unoccupied because of their harsh environment and poverty, these often show degeneration from a former standard. We may on the other hand find that the material culture of a people stands still or retrogrades while

social life or religion or philosophy continues to advance, or a people may, as a result of changed conditions, radically alter their mode of life, with the result that certain cultural traits decay and are replaced by new and different ones, better suited to the new regime. Degeneration in one field may thus be opposed by development in another. But that, for example, the Australian aborigines as a whole, are the degenerate representatives of a once much more highly cultured people, for this all real evidence is lacking.

And yet there are cases where a considerable and wholesale drop in culture seems to have occurred. Thus, the Yaghan of the west coast of Tierra del Fuego appear to have been crowded into this inclement and harsh environment, and there to have somewhat retrograded and lost some of the cultural traits, such as the bow, which they once had possessed. The Ostiak of the arctic shores of western Siberia are thought to have once lived much farther to the southward, in the region of the Altai, and to have had a knowledge of metallurgy together with other traits that, since they were forced northward, they have lost. Again, the semi-agricultural, sedentary woodland tribes of Algonkian and Siouan stock who, abandoning their former habitat, moved westward out into the Plains, lost agriculture, pottery-making, and their semi-sedentary mode of life, and became buffalo-hunting nomads. We have already seen in discussing the question of "lost arts," how the Polynesians in their eastward drift into the Pacific lost textiles, pottery, metal-working, and gave up the use of the bow. Yet here was no case of pure degeneration, for to some extent these losses in material culture were offset by gains, such as the development of the double canoe and skill in navigation. Degeneration there is also of another type, as where Cambodia having in the ninth to the twelfth centuries developed a remarkable synthesis of her own culture with elements

from India and later from China, collapsed under the attacks of the Thai peoples advancing from the north, and slid rapidly downward just as Roman culture sank into the Dark Ages after similar barbarian invasions.

But, although here and there a tribe, a people, or a culture declines (often, however, under favorable circumstances to rise again in a more splendid renaissance), culture as a whole advances. When Egypt and Mesopotamia dropped slowly from their former high estate, Greece carried culture onward with magnificent sweep; later, when European culture drowsed and sank backward through the Dark Ages, China under the Tang attained a brilliance which in large measure served to maintain the balance. So in the New World, when Mayan culture began to crumble in the thirteenth century as a result of civil war and Toltec attacks, the latter and their successors the Aztec in Mexico, and the Inca in Peru, together carried on the torch, only to have it extinguished by the Spanish Conquest under Cortez and Pizarro.

It is in the rise and decline of individual cultures that degeneration is most patent, and strikingly so in the case of the great historic cultures of antiquity. Egyptian and Babylonian, Assyrian and Persian, Greek and Roman cultures each in various ways rose from small beginnings to greatness and, after a longer or shorter period of brilliance, dwindled and ultimately disappeared as individual cultures from the world's stage. Egypt and Mesopotamia endured, with varying vicissitudes and with periods of decline and renaissance, for millenia before they and their cultures sank from view as individualized significant factors in human progress. Yet of their gains and achievements much lived on and passed directly or indirectly into the cultures that followed. Greek culture blazed out like a nova for a few centuries, and although as an individualized and localized

phenomenon it faded and passed away, the magnificent results which it attained endured as a most potent force among other peoples and in other lands. Cultures decline, but culture keeps sweeping on. The originators, the builders of a particular cultural type, seem after a time to exhaust their vitality; the quality of their genius fails, their intellectual hybrid vigor, the result in so many instances of the contact or blending of peoples, weakens until they cease temporarily, or for good, to contribute anything further of significance to the growth of culture as a whole. One need not follow Spengler to admit this phenomenon of apparent exhaustion, and one must not forget that the causes of the decline of individual cultures are extremely varied and complex. And one must recognize that the history of culture is to be compared to a relay race, wherein as one runner weakens and falters, another picks up the torch and carries it onward toward the unseen goal.

In discussing in a previous chapter the phenomena of diffusion, it was pointed out that, as a result, useful traits of culture were rarely lost. So if we consider the sum total of culture rather than the particular form of it which this or that people have developed, we see that its content, once meagre, grows with the ages more and more rich. It is a vessel into which the achievements of all peoples are distilled, and wherein they gather drop by drop. In the early stages of culture, diffusion proceeded but slowly as compared with modern times and, in part due to this slowness, the advance of culture went on at a tortoise-like pace. The archæological record bears witness that in Palæolithic times culture crept upward so leisurely that in a thousand years its advance might hardly be apparent. The rate has, however, steadily grown more rapid until in the last century the pace has become indeed breathless in comparison. To-day a new discovery or invention, a new theory or conception,

may spread in a few months over an area which would have been traversed in the Stone Age only in a hundred lifetimes.

This immense rapidity of diffusion, making almost immediately available to all an advance made anywhere, together with the development of concerted, trained, and purposive search for new inventions, serves to put our modern culture in a very different category from that of any in the past. A problem posed, a need felt, and at once in a hundred laboratories and workshops keen minds trained for this special end seek for its solution or satisfaction. In the earlier stages of culture, discovery and invention were, if not wholly casual at least largely so, and neither were in any sense organized. So that the difference between these processes as they were and as they form part of modern culture is not merely quantitative, it is also qualitative. Culture has in the last century entered on a virtually new path.

And not only in this respect. For the last two or three centuries have witnessed the beginning of a phenomenon new in the history of human culture, or new at least upon such a gigantic scale. In the past, great cultures have sought by military conquest and colonization to spread their influence widely, but their sphere of action, although often actually large, was yet relatively small. Mesopotamian and Egyptian cultures dominated but small territories after all, and even the Roman Empire was limited to the Mediterranean world and its tributary lands. Never before in history has one culture set out to dominate the whole world, as that of western Europe has done within the last three or four centuries; never before has so colossal a cultural experiment, involving diffusion of one culture into every environment and among every people, been tried. That western European culture has come to-day to rule the world is a commonplace it is true; we accept it as an obvious fact along with the marvels of modern means of communication and trans-

portation. We are not, however, always conscious of what it implies in the history of human culture as a whole. Some of these implications may therefore be discussed, to see if, from the present situation and what we have learned as to the principles and methods of culture growth in the past, we can at all attempt to forecast the future.

First, however, let us briefly sum up the net results of our whole discussion to this point. At the outset we saw that environment played a large and very important part in the origin and development of culture, in that it supplied the material basis upon which every culture had to draw, and by supplying certain factors and refusing others, it offered to every people a series of opportunities which they might or might not use, and set up certain limitations beyond which their culture practically could not advance. Yet, except for a few of these limitations, environment did not impose definite traits or a prescribed cultural form, since the extent to which and the manner in which the opportunities were taken advantage of by any people, rested in part on the quality and character of their genius, and also on the accident of geographical position and the course of history.

Environment thus forms the essential foundation on which a large proportion of the discoveries and inventions of a people depend and, with the materials supplied and under the conditions of life which the environment more or less strongly suggests, the genius of the people there resident evolves most of the basic features of its culture. The most, but not the whole, for every people brought with them at least the rudiments of culture which in his earliest home or homes had made man, man. How many and what traits composed this universal heritage one may debate, but some sort of common heritage there was which formed the ultimate foundation upon which all men built.

The culture traits drawn by each people, then, from the

opportunities and limitations of their habitat formed the basis of their culture, its warp, stretching between themselves and their environment. Across it the moving shuttles of diffusion spread the weft of exotic traits derived from far and near, combining warp and weft into a pattern which the genius and the history of each people determined for itself. Thus each ecological area, each region possessing an environmental character of its own, begot a culture area, in part correlated with it, and comprising a larger or smaller series of individual cultures, each the product of a people's genius, but all expressive, in varying degree and sometimes in varying fashion, of that common background shared by all. Some of these cultures, built up by peoples of uncommon ability, favored by location and a happy fate, grew great, spreading their influences by political conquest and peaceful diffusion over a wide radius. Each had its day and then passed on the leadership to another. Each great culture in its turn, in reaching out to dominate its neighbors, absorbed, modified, or suppressed with varying success the lesser cultures over which it came to rule, so that the rise of every great culture has tended toward a decrease in the cultural variety of the world. Yet, after a time, the variety has been renewed in some degree, for although a conquered people might be forced in large measure into the conqueror's mould, in time the new environment, the differing character and traditions of the people, and their old submerged cultural traits would breed changes, so that the imposed culture would take on another *avatar*. And similarly with colonists that settled in outlying lands, in time the culture they had brought with them would, being subject to new conditions, take on a different form. A great culture might attempt to take for its motto "e pluribus unum," but wherever unity has been in any degree achieved, it has been only temporary, and from it, under the pressure of environment and with

the aid of diffusion, variety issues once more. Yet the new variety lacks something of the sharpness of the old, for something has been lost in the process.

History presents us with example after example of this sequence, in little or in large, but never before has the phenomenon taken on such proportions as that presented to-day by the spread of the culture of western Europe. Not only does this stand out as the most striking example of the process in history, but it affords us an opportunity to observe at first hand the action of many of the forces which we have been considering that are involved in culture growth. In its progress it gives us, in epitome, a large part of the whole history of civilization, and from its living present, we can, on the one hand, better understand how in the past the early cultures grew, and on the other, venture to forecast something of the future.

At the beginning of the sixteenth century, looked at in the large, one general culture prevailed over most of western Europe. It is of course true that each nationality had its own form of it, and that, in details and even vital features, the cultures of England and France, let us say, or Spain and Portugal were sharply characteristic. Yet the culture of all derived in varying degree from that of Rome and, after the long sleep of the Dark Ages, all had been quickened by a similar renaissance. So when, after the period of the great discoveries during which the New World had been found and the seaways to the Orient opened to trade, Spain and Portugal, England, France, and Holland began to send out their colonists to take possession of the new-found lands, they came thither as representatives of one broad cultural type. Each national group of colonists, it is true, brought their own particular brand of this culture, but leaving this aspect of the question for the moment aside, let us turn to consider one of these groups alone—that which came from Britain.

The majority of the colonists who were responsible for the settlement of the United States, and the great bulk of the immigrants who came hither for the first two hundred years or so, were of British origin. They brought with them a form of western European civilization which was the product of long centuries of complex growth in a limited area among a particular group of people. Their colonization and immigration transplanted this culture suddenly across a wide gap into a wholly new sphere, so that we are dealing, thus, with a typical instance of discontinuous diffusion. The culture thus abruptly transplanted, came not merely into a new environment, but into a series of new environments, for the great territory over which the colonists and immigrants spread, offered a wide range of conditions. The rugged and forested hills of New England, the rich subtropical regions along the Gulf, the fertile open prairie, the arid Southwest, the humid forests of Oregon and Washington, presented each a radically different environment to which the immigrant culture became subject.

This New World to which the immigrants came was not, however, vacant; it had its own population and its own cultures. Within the area of the United States alone, some seven characteristic cultures were in existence, each the product of centuries or millennia of growth. The population, however, was in the main sparse, and the cultural status much inferior to that of the immigrants, so that the superior weapons and abilities of the latter, sooner or later, enabled them to drive the older occupants away or kill or absorb them while their own numbers were constantly recruited from across the sea. The conflict between the simpler cultures of the Indians and the higher cultures of the immigrants was an unequal one, and the older cultures, one after another, disappeared. The remnants of the older population, gathered on reservations, were forced to take on the culture of the victors, and to-day, except for among a

few especially conservative groups such as the Pueblo tribes of the Southwest, the old American cultures have very largely gone.

Yet, although in this clash of cultures the simpler forms have given way and the former cultural variety has almost disappeared, they have in some few respects left their impress on the civilization that has supplanted them. The use of tobacco, maize with its culture and many of its uses, maple sugar, the canoe, the snow-shoe, and toboggan—these are some of the traits which have been adopted from the older cultures so ruthlessly displaced. In sum, the effect of the contact on the higher culture was but small, whereas on the lower it was radical and ultimately destructive. At first voluntarily, as a result of diffusion, the aboriginal peoples took over such material traits as fitted their mode of life—the horse, firearms, metal tools, cloth and blankets, beads and finery. Then more reluctantly something of religion, holding more tenaciously to their social usages to the last.

But to return to the immigrant culture, this, once it had been transplanted to the new environments, began in various ways to undergo adjustment, modification, and new growth. We cannot here undertake to trace even in outline the manifold changes—material, economic, social, religious—that occurred. They are written large in the history of our country, and many of them are commonplaces to us all. Merely as examples, however, one might refer to the changes in material and form of house and building construction, where from the brick and stone of English architecture, the early colonists had to turn mainly to wood, at first the primitive log hut, later replaced by the wooden house, which, in its various forms, some pleasing, some hideous, is still almost universal. Or note in more recent times the development, as a result of complex socio-economic causes, of the skyscraper and its most recent modification, terraced back

like the Pueblo structures of the Southwest. Or on the economic side, one need only refer to the rise and development of slavery in the South where the environment and economic situation alone rendered it really profitable, or to the disappearance of the landlord-tenantry complex, which proved in general unsuited to conditions where there was land enough for all.

The common factors which were present throughout the whole series of varied environments into which the immigrants spread, the latter's prevailingly single origin, the national unity which was achieved, and the increasing freedom and rapidity of communication which was established, have served to preserve a large degree of uniformity in the whole product of culture which is the result of these three centuries of growth, so that we recognize clearly a distinct American type as having evolved. Yet no less certainly are regional varieties of that type taking shape before our eyes, varieties growing directly or indirectly in large measure out of the special restrictions and opportunities offered by the different environments which the United States affords. The characteristic flavor of the culture of New England or of the South has long been apparent, but no less surely are other forms taking shape in the newer regions of the Middle West, the prairie states, the Southwest, California, etc. A vast experiment in the influence of environment on culture is thus going on, of the significance of which we are, as a rule, only dimly conscious; an experiment in which from a single parent culture, not one but a whole series of new cultural types and subtypes are being born. The process is nothing new, for it has been active throughout human history, and has been responsible in no small degree for the variety of cultures which the world has known. But although the process is in no sense new, it is working here on a scale probably never before approached.

Yet it must be remembered that although the influence of environment in shaping new forms of culture is, as a factor, as old as the race, its potency in the present instance is in many ways less than in the past. For one of the striking features of modern civilization is the extent to which it is able to override environment and become independent of it. So although the differing environments of the United States exert a constant pressure toward the development of special cultural forms, their effectiveness is greatly diminished, compared to what would have been the case in the past. We may expect, therefore, that the results will be less pronounced although still in time significant.

But adaptation and modification are not the only changes which the introduced culture has suffered, for new conditions inspired new discoveries and inventions to meet new needs. A whole continent lay open for the discovery of the riches in the way of raw materials which it contained, and to the exploitation and utilization of these a vast amount of thought and energy have been devoted. The new needs—physical, social, and economic—have called forth a flood of inventions and developments that have enormously strengthened and at the same time complicated the culture, and these in part, at least, have been correlated with environment. The new needs were in part due to the changed physical conditions under which the people lived, in part the outcome of social and economic factors due to the increasing density of population. The conditions for discovery and invention were highly favorable, in that there was an abundance of new opportunities waiting to be made use of, the faculty of observation was trained by pioneer and frontier life, and the percentage of ability and genius was high in a population in large measure selected from a more than usually able people, and winnowed in the hard school of experience in new surroundings.

The physical needs were, as a rule, those which were first met by inventions great and small in bewildering number and variety. In many of these, the correlation with environment is clear, as, for example, in the case of much of our elaborate agricultural and harvesting machinery, which is adapted primarily to the great size and special character of our Western farms. Or in the development of steam and hot water heating, called for by the long, cold winters of the Northern States. But although many of the vast number of inventions here made are correlated in some degree with particular environments, and were devised to meet some local need, probably the majority are based not on regional but on universal needs and factors, and being independent of environment, are useful in Kalamazoo and Timbuctu as well. This tendency, recognizable also in the history of inventions as a whole, has, it would seem, significance for the future. Social and economic needs, although not at first so pressing perhaps, were not to be denied, and new forms of government, new systems of education, new types of industrial organization, and other innovations have been devised, the increasing density of population bringing needs of this sort more and more insistently to the fore. Religious and æsthetic needs have also made themselves felt, and have been met in the former case, for example, by the formation of new sects, or the development of new faiths, such as Mormonism and Christian Science. Æsthetic needs appear to have been more slowly felt, but have evinced themselves in various ways, such as in the creation of national parks in regions of great interest or scenic beauty.

In a country so large as the United States the need of efficient means of communication and transportation is acute, and to the meeting of these needs, new inventions were devised or adopted, or old ones perfected, and applied rapidly on a tremendous scale. At first by the telegraph,

then by the telephone all parts of the country have been linked together with a completeness unrivalled elsewhere in the world, and to this the recent amazing development of the radio has added an almost incalculable further increment. By steamship and railway, and now by the universal use of the automobile, the ease and rapidity of transportation have been developed to a point unequalled elsewhere, and to this the possibilities of aviation (an invention perfected here) bid fair to add still further in the near future.

If environment, by stimulating discovery and invention, has played and is playing a striking part in the growth and strengthening of the civilization arising out of that brought to America by the immigrants of three centuries ago, diffusion, aided enormously by the great developments in communication and transportation, may do little less for its enrichment. The almost incredible increase in these facilities which our modern civilization affords, are so much a matter of course with us that we rarely stop to consider and find it hard to realize the conditions of other days. Two or three hundred years ago only, communication within the limits of Europe even, not to speak of distant lands, was slow, irregular, and uncertain. There were no newspapers, and rumor, and the reports of casual travellers, together with letters sent privately, were almost the only means of disseminating news or knowledge. For the limited number and small circulation of books, combined with the limited ability to read them, made the spread of knowledge extremely slow. By halting and often precarious channels a scanty representation of the products of far countries came in small quantities to hand, and were available at high prices only to the few. The immediate ancestors of those hardy colonists who first settled these shores, and even more so, they themselves, were thus shut up in a relatively little world to which diffusion brought but languidly and errati-

cally the enriching knowledge and products of the world without. They were still living, in fact, under much the same conditions as regards the speed and mass of diffusion as had prevailed for a long period in the past.

To-day the contrast, although only too obvious, is almost fantastic, for our means of communication and transportation are not only literally world-wide, but so rapid that for communication, at least, time and space have been practically eliminated. Through the enormous development of printing, the multiplication of libraries, and the greatly extended ability to read, the printed word in books is now available in the United States on a scale never before known, while the newspapers, ramifying beyond these facilities to the remotest settlements, supply an *olla podrida* of ephemeral news and scattered information that is very varied in its scope. The telegraph, the telephone, the radio, and the screen bring to us almost instantaneously not only the news of all the world, but a vast mass of information and knowledge from which we are at liberty to take what we will. And television and radio-photography bid fair to enable us not only to hear but to see instantly, or within a few hours, things taking place half the world away. The consequences of this enormously expanded and more rapid diffusion cannot fail to be far-reaching. The same holds true in respect to transportation, in consequence of whose increase in rapidity and carrying capacity the world's products are at our doors. Tasmanian apples and South African grapes, defying the seasons, or reindeer meat from the arctic are on our tables, our clothes are woven of antipodean wools and fibres; there is hardly a feature of our daily lives that has not some contact with the ends of the earth.

As a result of all this, the products and inventions of the whole world and the actions, the thoughts, and the experiences of all peoples throughout all history are at our dis-

posal to utilize if and as we will. Never before have the opportunities for diffusion been so extraordinary or the rapidity of dissemination so great, never has diffusion been so intensively at work as here and now in the United States. So, as the stimuli due to new environments and conditions have led directly or indirectly to a vast increase in the basic or warp elements of our culture and added to its strength, the unprecedented mass and rapidity of diffusion are making an unparalleled abundance of exotic traits available from which to supply the richness of its weft. Available, yes, but how are these magnificent opportunities being used? The value of the treasures brought by diffusion must first be appreciated, then those of service wisely employed, if a culture of real richness is to be built. This appreciation and wise selection depend in large measure on the ability, mental fibre, and genius of the people to whom the treasures come, as does the pattern which the resulting cultural fabric will take. Here, then, comes in that last and most elusive factor of nationality and race.

The earlier colonists and the great majority of the early immigrants to the United States down to the end of the first half of the nineteenth century, were, except for the Negro slaves, of British origin. They brought with them not only the content of the culture of the Britain of their day, but also the abilities, the temperament, and the genius of that people of which they were a part. They brought a definite pattern of culture as well, the composite product of their environment, their mentality, and their history. In ability and genius this original stock, itself the product of long blending, was of the best, and to this the culture that they builded is witness. For two centuries they built according to the pattern that was their heritage, then came the great wave of immigration of the last century, which wrought a fateful change. For Irish, Scandinavian, and

Teuton, French, Italian, and Slav, together with the host of lesser breeds that pressed into the country in an endless stream, brought each their own peculiar abilities, temperaments, genius, and culture patterns to contribute to the common enterprise.

Both the numbers of these immigrants and their racial and national diversity were without parallel in history. During the century between 1820 and 1920 approximately thirty-five million people came into the United States, a number which added to the ten millions of Negro descent, forms nearly half the total population of the country. Of these newcomers approximately half came from Western Europe, from Britain, Germany, and Scandinavia; nearly five million were from the southern European countries, from Italy, Greece, Spain, and Portugal; and some seven million were Slavs and Jews from the eastern portion of the continent. When the number of immigrants is small in comparison with the mass of the population, the ultimate effect of their differing ideals, temperaments, and genius may be slight, since they may quickly be forced to conform to the dominant standard, or if not, the leaven may be too feeble to produce a notable effect upon the whole. Where, however, the number of immigrants is large, their influence cannot fail to be significant. So, when recently the differences in ideals and behavior of these newer elements in our population began to force themselves on our attention, we became jealous lest our own ideals and culture pattern should suffer. Consequently, we are exerting ourselves more consciously to try to mould the newcomers to our traditional forms—in other words to Americanize them.

To some extent, perhaps to a large extent, we shall undoubtedly succeed in this, but below the veneer which Americanization activities may supply, and beneath the outward observance of American customs, something of the multi-

colored national and racial characteristics will inevitably remain. There are those who, with an exaggerated and unjustified belief in the supposed absolute superiority of Nordic ability, temperament, and culture pattern, deplore the passing of the old order of relative unity of traditional culture forms, and who see in this inevitable infusion of exotic factors and ideals, a peril which they dread. Yet unbiased judgment can hardly fail to welcome the addition of many of the characteristics brought by these other national and racial groups, and cannot fail to recognize that, wisely assimilated, they will add greatly to the richness, variety, and charm of the tremendously complex civilization which is growing up before our eyes.

But there is danger lest in this great experiment in national and racial blending, too large an infusion of other temperaments and ideals may occur, or that clearly undesirable ingredients may be mingled with the good. There is danger that low ideals or dangerous and subversive temperaments may be brought by defective and criminal classes, whom their mother countries are only too glad to export. Danger that such a flood of the more backward peoples should come that by their lack of vision they might, at least for some time, become a dead weight tending to hold all culture back. Or danger, lastly, that through an ever widely open door, either so vast a mass of some particular people should enter as by sheer weight of numbers to produce not a welcome enrichment of our culture, but its virtual replacement by their own, or so variegated a population should result that by the multiplicity of ideals all hope of attaining any one might be lost. In other words, that too many cooks might spoil the broth. So much of sterling worth there is, so real and unquestionable an advance in culture has been made here by general adherence to the culture pattern which the early settlers brought, that no one could wish to see its

future promise wrecked by dangers such as these. To broaden and enrich that pattern slowly and wisely; to welcome gladly a large measure of varied ideals and new genius; to hold the rudder firm toward an inspiring if distant goal, would be, indeed, the part of wisdom. But to throw up the tiller, leaving all to chance, or, the journey well begun, to yield it carelessly to those with little training or seeking widely different goals, would be the part of folly. At the last moment almost, but yet perhaps in time, these growing dangers have been felt and a wise measure of restriction on immigration imposed, so that the safety of this greatest of experiments in the blending of peoples and cultures has been, so far as may be, assured. For by seeking only the best, by limiting the annual contribution of each national group, and by striving to maintain definite relative proportions between the various types, we shall avert, as far as may be, the grave risks which an unlimited immigration would entail, not to our own culture alone, but to culture as a whole. And with these risks avoided, what a vista of magnificent possibilities is there! For all the greater cultures of history seem to have owed much of their greatness to this process of the blending of temperaments, genius, and ideals. Egypt and Babylonia, Greece and Rome, India and China, all in varying degree, drew from blended peoples and cultures the power that made them great. With the ages the circle of those who participate in a culture's growth has widened, and in this last experiment its circumference includes almost all the world. If, with the world to choose from, we choose wisely of the best, the possibilities which lie before us with the co-operating stimuli of varied environment and intensive diffusion seem almost limitless.

From the foregoing it may be seen how striking and also how instructive is the colossal experiment in culture building taking place in the United States to-day. In this experi-

ment, one form of the ancient and complex culture of western Europe, suddenly transplanted to the North American continent, has there, subject to the influences of new environments, aided by the marvels of modern communication and transportation, and favored by the contact with new and varied ideals, blossomed forth into a new culture, incomparably stronger and richer than the old, and in character differing widely from that growing out of the latter in its original habitat. Yet, striking as this spectacle is, it is only a part of the much wider phenomenon of the spread of the British form of western European culture throughout almost all the world. For this same British culture has been transplanted not only into the United States, but into Canada, Australia, New Zealand, and South Africa as well. And, as in the instance just outlined, the original culture has undergone and is undergoing surprising changes, so in each of the other areas, far-reaching modifications and new growth are taking place. In each, however, the factors of environment, diffusion, and race are so differently involved that the resulting lines of development are widely variant.

Nor are these great experiments in culture building the only ones in which the observer may watch the differential development of a single cultural type exposed to widely varying conditions. A parallel case is supplied by the transplanting of other forms of western European culture. From Mexico to Cape Horn what might be termed the Iberian culture of Spain and Portugal was introduced by conqueror and colonist in the sixteenth century, and under varying conditions of environment, diffusion, and racial mixture, has developed a series of divergent cultures as significant to the student as those derived from Anglo-Saxon models. In any study of the problems and processes of the growth of culture, these two great examples of discontinuous diffusion on a colossal scale, are of unusual interest, and the

parallels and contrasts between them offer a fascinating field for study.

But wide as is the scope of the problems just suggested, and vast as is the area involved, we are still dealing, after all, with but one aspect of the yet greater phenomenon of the general diffusion of western European culture, either directly or through its descendants, over the entire world, and the even broader questions to which this gives rise. For quite apart from the great colonization experiments which have been mentioned, modern cultures of western European origin have in the last century or two, penetrated in some degree among all peoples. In another connection the dual effects of diffusion have already been emphasized. It acts, on the one hand, to preserve cultural traits, so that to its operation much of the continuity of culture is due. But although it thus plays the part of Vishnu as the Preserver, on the other hand it plays that of Siva the Destroyer as well, since in largely replacing, as it sometimes does, one culture by another, it leads to a reduction in cultural variety. For as a result of the diffusion of a strong and virile culture, former clear-cut differences and contrasts are somewhat levelled, so that the picture becomes a little blurred, the color-values toned down.

Of this process the most striking example is obviously the world-wide diffusion of western European culture, to which reference has just been made. Where colonization has occurred on a considerable scale it has largely supplanted and destroyed the older cultures; where it has penetrated merely by conquest it has often profoundly modified, but not supplanted or destroyed; where it has made itself felt along the lines of commerce or as a result of missionary activities its effects, although less drastic, have been none the less sure. In this process the manifold cultures of the Western Hemisphere, slowly evolved through millennia in isolation from

those of the Old World, and culminating in the civilizations of Mexico, Middle America, and Peru, have been either destroyed or completely transformed. The lowly but strikingly characteristic cultures of the Australian natives have been wiped out, and a whole continent integrally incorporated into a new cultural world. It is a commonplace how universally elsewhere our civilization has reached even the remotest peoples in some degree, breaking down little by little their native cultures, modifying their ways of life and thought, and taking from them something that was theirs of individuality.

We believe that what is changing, what has perished, is replaced by something better, and that what we are witnessing is a phenomenon for which we should be profoundly thankful. The Australian Commonwealth is surely of far greater value to the world than a continent sparsely peopled by primitive savages. This is as unquestionably true as the process is inevitable, yet one cannot but feel a certain regret that so much of the colorful variety in culture which existed so recently, has passed or is doomed to pass away. One cannot help feeling a wistful longing for the old pageantry and romance, the clear-cut individualities which are being ruthlessly eliminated from an increasingly standardized world. It may indeed be convenient and an evidence of progress to be able to buy one's accustomed brand of safety-razor blades in Peking or Assouan, in Fiji or Cuzco, as easily as in New York, but the fact takes something of the flavor and bouquet out of life! To-day we travel in a first-class railway carriage or automobile, the "Silken Road of Samarcand." The past is always glamorous, and in this age of automobiles the stage-coach is already haloed with romance. Yet glamor aside, in the breaking down and disappearance of individualized cultures, culture as a whole has suffered a real loss.

There are, however, other more significant aspects than this, of the triumphant spread of a culture which threatens, for the first time in history, to become a world-culture embracing, or at least influencing in some measure, all peoples in all lands. On a scale wholly unprecedented, as we have seen, a type of culture originating, in the main, in one environment (that of western Europe) is spreading into every kind of environment from the arctic to the tropics, from the stark deserts of the Sahara to the languorous strands of the South Seas. In marvellous fashion, however, this culture shows itself able to dominate environment, to build a Kalgoorlie in the heart of a pitiless desert, or carry the luxuries and sanitation of New York into the feverish jungles of Panama. By sheer force of determination, invention, and mechanical skill we may now largely override the barriers which hitherto environment has imposed, and are thus increasingly able to free ourselves from those environmental urges which in the past have served to develop local cultural types, whose strength and permanence have in considerable measure rested upon that very accord between culture and environment that we are thus increasingly free to disregard. The very ease and rapidity of communication, the extensive migrations and the multiplicity of contacts that have enabled our Euroamerican culture to diffuse so widely, have likewise served, as we have seen, to bring us a myriad traits from every corner of the world and every culture, enriching our whole civilization with a wealth which is incomparable.

All this is trite enough, but the question arises whether, perhaps, this world-wide spread, with its marvellous domination of environment, is not accomplished at a price; whether the unprecedented richness of our whole modern civilization may not, after all, contain a menace? For if much of the strength of a culture lies in its warp, in those

traits arising directly or indirectly through reaction to environment, are we not weakening our civilization, perhaps unduly, by just so much as we free ourselves from this control? And may we not, by overenrichment of the weft, sacrifice clarity and beauty of pattern for a mere surface iridescence? There would seem to be a certain danger here, and a menace which might be more grave, were it not for two facts of importance.

The first is that, phenomenal as has been the spread and enrichment of Euroamerican culture during the last centuries, it has been accompanied, as already noted, by a parallel and equally amazing development of invention and discovery. The fabric of culture has thus been strengthened even as it was being extended and enriched. For the countless inventions great and small have been in large measure of a type dependent on universal rather than on local factors. The marvels of steam, electricity, and chemistry are not tied to any special environment, for we can use railroads, steamships, or automobiles, set up telephones and radio, and employ aniline dyes or dynamite almost anywhere if we wish. We are not only thus counteracting an unprecedented spread into strange environments by a parallel amount of invention, but these inventions, being largely independent of environment, serve not alone to strengthen the fabric of culture wherever it may extend, but also by virtue of the universality of the factors involved, tend to make that culture more and more a true world-culture.

The other fact is that, in spite of the extent to which our modern civilization is able to free itself from environmental control, it is, as we have seen, far from having escaped completely from its influence. In common with all its humbler predecessors, it is being slowly but surely modified by local conditions as well as by national and racial differences. In other words, it is not only developing the characteristics

of a world-culture, but is also stretching new warps fixed to local environments, and evolving new local cultural types which constantly add to its strength. We may look forward, thus, with confidence to the rise of new and important variants of our present-day culture as a result of its world-wide spread. Yet these cultures of the future will differ, in one respect at least, from those of the past, for they cannot be as sharply cut, as individual. For good or ill, privacy is becoming more and more impossible for peoples as it is for persons, and the rapidity and vast range of modern means of communication and transport have made impossible the degree of individuality to which, in the past, a culture protected by natural or artificial isolation might attain. No future generation may hope to thrill with amazement at the discovery of a new culture as startlingly unique and strange as that of the Inca, or as curious and intriguing as that of Japan.

That, bewildered by the great wealth of cultural traits available as a result of the modern development of the mechanism of diffusion, or confused, as in our own case, by a multiplicity of ideals and culture patterns due to national and racial panmixia, we may achieve not the beauty of a nobly conceived, even if complex pattern, but only the brilliance and surface lustre arising from the haphazard mingling of every available hue—that danger is to be escaped mainly by our own wisdom, forethought, and fixity of purpose. The history of cultures and of culture as a whole, with all the lessons of failure and success which they afford, are open to us to-day in a fulness never known before; if we can profit by them in equal measure, the future would seem to be assured.

As we review the history of culture, in one sense the cycle of culture building seems to have come full round. In the beginning of his history man spread widely over the

earth, carrying with him the more or less uniform and very simple culture which marked him off as man. Little by little differing environments and other causes led to adaptations and improvements, resulting in countless local cultures, each of which gradually and in varying degree became enriched by the process of diffusion, which brought to them exotic traits evolved elsewhere. From time to time, now here, now there, great civilizations stronger and richer than their neighbors arose, and by conquest and diffusion came to dominate large areas. Yet great as they were, no one of them included even a single continent in its grasp. To-day our civilization is penetrating into every corner of the entire world. We spread, as did our early ancestors, essentially one basic type of culture, but one incomparably stronger, higher, and more complex than theirs. Yet, although thus in a sense the cycle seems to repeat, there is an all-important factor now present that was absent before. For modern civilization spreads not as at first, over a world empty of human culture, but over one filled with a multitude of varied cultures, some of which it may only influence, some dominate, some entirely supplant. The circuit is indeed complete, but the path traversed has been a spiral, not a circle. Culture is now again, so to speak, above its starting-point, but on a higher plane; it has entered upon its second round.

We live in a three-dimensional world, and human culture is built in accordance with it. It is not linear and one-dimensional, as the extreme diffusionists would have it; it is not a mere two-dimensional surface of contrasted habitats, as the environmentalists might be said to describe it. It is rather a solid structure, set firmly on a base whose breadth lies in the variety of environment which the world affords, and whose length is the sum of all diffusion throughout the whole of human history. The height to which it rises is va-

ried, and is measured by that elusive something, compounded of intelligence, temperament, and genius, possessed in differing degree by every tribe and nation and race. We of to-day have builded high indeed, but upon a base so extensive those who come after may well build far higher.

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